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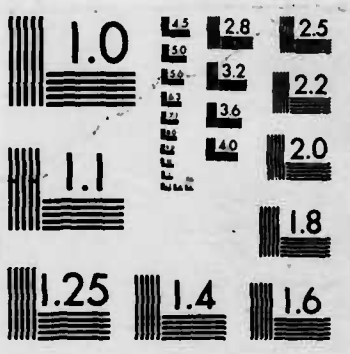

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Tekhnika i vooruzheniye (Engineering and Weapons), March 1986.

[ON THE OUTSIDE FRONT COVER]: PHOTO BY I. YATSENKO

IN THE MILITARY DISTRICTS, GROUPS OF FORCES, AND IN THE NAVY

THE RED-BANNER FAR EASTERN MILITARY DISTRICT

Photographs by I. Yatsenko.

All of the following qualities are typical of each soldier of the Independent Repair and Rebuilding Battalion: a high professionalism, a will to strive to faultlessly accomplish any task, and individual initiative. The Battalion is headed by Colonel L. Grishchenko, Cavalier of the Order "For service to the homeland in the Armed Forces of the USSR" in the Third Degree.

Battalion Commander L. Grishchenko and the Chief of Staff of the Battalion, Captain V. Chebanenko, are working on planning problems.

The Deputy Battalion Commander for the Technical Unit, Captain V. Gor, tunes inspecting and testing equipment.

The Technical Diagnostic Station of the Battalion is among the best in the District.

Operational in a matter of minutes, soldiers from Lieutenant A. Podkolzin's Platoon install the production tent.

TO FULFILL THE COMMITMENTS WHICH HAVE BEEN ACCEPTED

The Plans which have been projected by our Party in the developent of the Soviet society for the present phase are wonderful. The most significant place in terms of the implementation of plans belongs to the Twelfth Five-Year Plan, which is the first of three bringing the twentieth century to a close. The primary task of the Twelfth Five-Year Plan is to increase the tempo and effectiveness of the development of the economy through acceleration of progress in science and engineering, intensive use of the developed production potential, improvement of the system of control, improvement of the economic system, and an elevation of the welfare of the Soviet people through these measures. A wide circle of tasks are to be undertaken simultaneously in the Five-Year Plan associated with the improvement of the life of the Soviet people, connected with the achievement of a dynamic development of all branches of the national economy, and with the maintenance of the necessary level of national defense preparedness.

An essential feature of the projected Plans is that the growth of national income and products in all areas of the production of material goods will immediately be derived because of an increase in the productivity of labor. As a result of a reduction in the consumption of materials, a conversion of this economy into a decisive source of satisfaction of the requirements of the national economy is planned in terms of supplementary material resources. The tasks of creating a structural perestroika of the economy and concentration of capital investment in the national economy in the directions that are given priority. The basic point of emphasis will be on the technical re-equipping and redesigning of existing enterprises.

The fulfillment of the Plans for the economic development of the USSR and the use of all of the resources of our society for further improvement of material production are the primary conditions supporting the required level of national defense of the USSR and of the combat capabilities of the Army and Navy. The Soviet Armed Forces, created and led by the Party of Lenin are worthily carrying out their mission. Their powerful combat potential, representing a sturdy blend of highly technical equipment, mastery of military principles, and an unbreakable moral spirit in the personnel, is based on the superiority of socialism.

Significant and complex tasks were assigned to the Armed Forces in the 1986 training year. The fulfillment of these requires a great concentration of forces, a high degree of organization, further improvement in the quality of work in all

units, and assuredly following the course set by the Party for reinforcing the exacting and demanding nature of the methodology for decisive elimination of deficiencies and omissions.

The main forces for the solution of assigned tasks are aimed at the direct fulfillment of the requirements established by the Central Committee of the Party and by the Soviet Government with respect to increasing vigilance and combat readiness, to the capability of the troops and naval forces for definitely and assuredly repulsing any attack of an aggressor and providing for successful action in any conditions under which they may be entangled in a war.

One of the most significant elements in the combat potential of the Armed Forces is how they are technically equipped. The Army and Naval Forces at the present time are armed with modern models of weapons and technical equipment which possess a great range and speed, a significant striking power, and high accuracy for hitting the target. In developing these weapons, the latest achievements in scientific and technical progress are widely used, and, in the forefront, our successes in the field of nuclear physics, radio-electronics, computer technology, and other branches of science and technology are included. However, weapons and military technology of themselves cannot provide success in operations and in combat. It is necessary that those serving in the military to whom these instruments are entrusted have an excellent knowledge of them and be able to masterfully use them, that they be able to take from any model of contemporary weaponry everything that is built into its design and make maximum use of its combat potential.

Rapid training on new types of weapons and combat materiel is particularly emphasized. The solution of this task requires timely training of the appropriate specialists and, first of all, training of officers. Only by satisfying these requirements is it possible to train detachments and crews, and to achieve the correct and competent operation of new weapons. When planning this work, our attention must not be distracted away from weapons which were supplied to the ground troops and Navy at an earlier time.

Each weapon and all of the standard materiel should continuously be kept in good working order and in full readiness for use in combat. In order that this might be accomplished, in the units, on ships, and in subunits it is necessary that maintaining the weapons, storing them, and timely servicing of them be stricly organized.

Presently, in the Army and in the Navy the struggle to fulfill the Socialist obligation under the motto "We are fulfilling the decision of the Twenty-seventh Congress of the KPSS [Communist Party of the Soviet Union], and we trustworthily protect the achievements of Socialism" has been actively developed. Competition has become an inseparable part of the training process, and has taken organizational forms that have

allowed the maximally effective use of each hour of training to intensively master the military materiel and weapons, to increase the quality of the ground, air, and sea training. In the future higher limits of combat readiness should be observed, and we should struggle to master the associated specializations, and to increase the classroom qualifications. In the ground, air, and sea training of troops, as in the past, the main principle continues to be to teach the troops what is necessary for war. Therefore, the foremost attention of the commanders, political workers, and of the engineers and technicians should be focused on seeing to it that the personnel should be taught to master perfectly the basic weapon and materiel they use, that they should be able to effectively use them in battle, carefully keep them in constant combat readiness, service them on a timely basis, and give them repairs of the highest quality.

The successful fulfillment of Socialist obligations by the personnel of the Army and Navy promotes high creative activity on the part of the soldier-innovators who have raised the technical level through the developments which they have made. Valuable inventions and efficiency-promotion suggestions, have been put into widespread use, which were aimed at increasing the combat readiness of the units and ships, at the improvement of the training equipment base, at the creation of highly effective training resources and of complicated training simulators, at the acceleration and increase in the quality of the technical servicing of military materiel, of periodic maintenance and repair work, and at economy and care in the utilization of material values and monies.

As experience teaches, the quantitative and, particularly, the qualitative indices in the area of invention and efficiency promotion, have increased significantly in those military collectives which have taken an active part in the inspection and officers' competitive examinations "about the number produced and a high degree of effectiveness of scientific and engineering creative power". The preliminary results of the second phase of the inspection and officers' competitive examinations indicate that the most favorable results were achieved by the Strategic Rocket Troops, by the Military Air force, by the Navy, by the Order of Lenin Moscow Military District, and by the Turkestan Red Banner and other Districts, by the Group of Soviet Forces in Germany, by the Baltic Fleet, which has twice received the Red Banner, and by many units and repair enterprises of the central subordination.

Army and Navy innovators are successfully solving complex and pressing problems. The recently concluded officers' competitive examination on material for the manufacture of targets used in small-arms practice serves to confirm this. The material proposed by Lieutenant Colonel V. Chistyakov and A. Adashevskiy, which is polyethylene reinforced with two metal nets, withstood the tests and has been recommended for use in the serial manufacturing of targets. The developers have been awarded the first prize in the amount of 2000 rubles.

The Socialist competition for fulfillment of the decisions of the Twenty-seventh Congress of the KPSS is a logical continuation of the pre-Congress stage in this expiring training year. All of that which is valuable and useful, which has provided us with our past experience, should be used and augmented in the new training year. First of all this relates to the orientation of the competition towards the achievement of good final results in the solution of military preparedness tasks, in the improvement of the troops and Navy personnel, in the increase in the effectiveness and quality of training and service of the personnel, and in the succcessful accomplishment of the tasks which have been assigned by the Minister of Defense of the USSR for the 1986 training year.

THE ROUTE MARCHES OF THE FIVE-YEAR PLAN

TIRES ARE GOING TO WEAR LONGER

B. Nenakhov, Head of the Experimental Design Division of NII [Scientific Research Institute] of the Tire Industry and Graduate Engineer and M. Rekitar, Senior Dissertation Supervisor of NII of the Tire Industry and Graduate Engineer

> "...to expand the output of steel-belted radial tires and new model super-heavy vehicle tires ..."
>
> From the Project for the Basic Directions of Economic and Social Development of the USSR from 1986-1990 and for the period up to the year 2000

Increasing tire life or the operational durability of tires requires accomplishing a whole series of technological tasks. The development and optimization of tire design is aimed firstly at the improvement of their operational characteristics for various road and climactic conditions and operational regimes. The developers are striving to increase the load capacity of tires and concurrently to decrease their size and rotational resistance. At the same time, an increase in durability is being achieved, tires are being made more repairable, and they are easier to manufacture.

At present, industry is producing tires of two basic types, diagonal cord and radial tires. In the diagonal cord tire, the threads of the cords in adjacent layers are crossed in pairs, and there are an even number of layers. In the tread area of the tire, the casing is reinforced with a breaker of two or more layers of open-weave textile cord (Also with crossed threads). Under some types of operational conditions, the diagonal design is preferable. Therefore, these continue to be produced and improved. In this way, a tire has been developed which is 15% lighter in weight, and is less subject to wear.

Radial tires are considered to completely fulfill present-day needs. The threads in their cords are aligned in meridian or radial directions. As a rule, there is a multi-layered reinforcing break of metal cords in the area of the tread. The radially oriented threads in the cord tends to reduce the stress in the cords, and, as a result, to reduce the number of layers in the casing, cutting down on the weight of the tire. The presence of a comparatively rigid breaker belt in conjunction with a thin-sidewalled carcass makes it possible to achieve maximum pressure of the tire on the roadway or ground and to reduce the slippage

in the contact area, and, in this way, to reduce the wear on the tread and the resistance to rolling. Additionally, by using radial tires, traffic safety increases due to improvement of the gripping quality, and fuel consumption is reduced by 3-5 % as a result of reduction of the resistance to rolling. These merits of radial tires have resulted basically in a constant growth of the proportion of the general tire production which is made up by them.

At the present time, radial tires with metal cord in the breaker and fabric cord, preferrably of nylon, in the casing have begun to take the lead. Such tires have been developed for all trucks and buses. It may be said that radial tires with metal cord are the most effective.

The majority of tires for trucks have a universal tread design. Bus tires have a more serrated tread design, and, in connection with this, the tread is deeper than in truck tires.

In recent years, the production of tubeless tires designed primarily for use on improved surface roads has noticeably increased. The Conversion to tubeless tires has resulted not only in an economy of materials and a reduction in tire weight, but also in an improvement in the reliability of tires. The absence of friction between the casing and the tube reduces the heat generation, resulting in less resistance to rolling. Correspondingly, the vehicular fuel consumption is further reduced.

The broad development of inter-city and especially international trucking has stimulated the development of tires with metal cords in both the breaker and carcass which exhibit a high operational performance and reliability under long-range main-line highway conditions with maximum loads and at high speeds.

For a further increase in the load-carrying capacity and a reduction in the weight of tires, low-profile radial tires are being developed. Use of these tires reduces the height of truck beds or the level of bus floors without increasing the tire pressure on the road. At present, low-profile tires have been developed to replace dual-wheel tires on trailers and semi-trailers behind KamAZ trucks. In this process, the weight of the trailers is reduced by almost 190 kilograms. A low-profile radial tire with a universal tread design which provides almost the same operational performance for vehicles on hard-surface roads as under off-road conditions is being produced for installation on a new trailer with increased load capacity and also on the new agricultural truck, the KAZ-4540, and the trailer behind it.

A specially developed low-profile tire with an improved tread for cross-country travel makes it possible to traverse very water-soaked ground with confidence with the KAZ-4540. This tire is also being tested in several truck models from the Ural Motor Vehicle Plant.

(1) Low-profile tires for the agricultural truck, the KAZ with attached trailer, deliver almost the same performance for the rig whether travelling off-road or on paved roads.

(2) Special wide-profile tires have been developed for the KamAZ all-wheel drive truck.

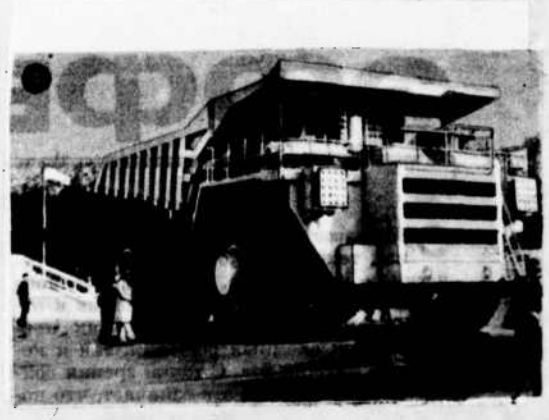
(3) Tires specially designed for long-range operation at high speeds have been built for inter-city transport in MAZ trucks.

The work on improvement of tires for vehicles from the Kamsk Motor Vehicle Plant is continuing, with consideration of the specific requirements imposed by the conditions under which they are operated. So, for the main-line truck rigs, the KamAZ, a tire with increased load capacity and reduced proclivity for tread wear has been developed, while, for dump trucks, the development of a tire with a universal tread design is being completed.

The Minsk dump trucks have received a new tire with a 10 percent higher load capacity, which was achieved without reducing the life of the tire.

Experience in operating dump trucks produced by the Kremenchug Motor Vehicle Plant in quarries and on construction sites, and also on the BAMa [Baykalo-Amur Main-line Railroad] has resulted in the development of the so-called quarry tread design.

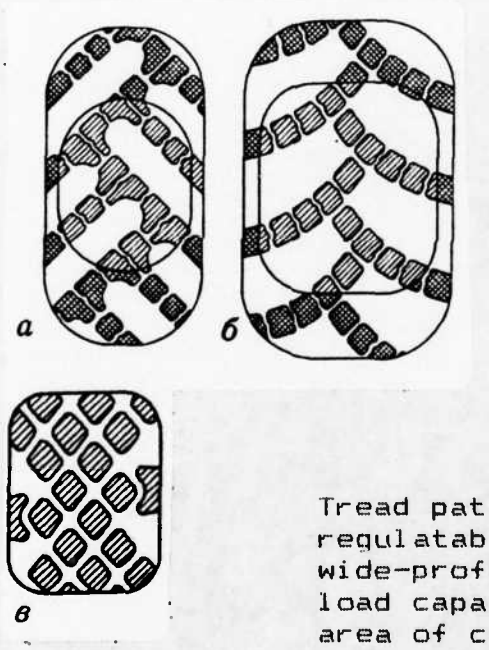
The development of new regions of the country, the construction of main gas lines, the laying of electric transmission lines, and the accomplishment of other large scale operations involve hauling loads under varied road conditions and in cross-country hauling require a wider use of all-wheel drive vehicles. Therefore, a great deal of attention is being directed towards the development, production, and introduction into use of special tires for machines meant for particular operational conditions. Moreover, both standard tread and wide-tread tires, with pressure regulatable while in operation and designed for 1650 to 9000 kilogram loads, also belong in this category. There are a number of specific requirements imposed on off-road tires. They should put a small specific gravity on the ground, possess high traction qualities on soft ground, etc.



(4) Production of a tubeless tire for the 180-ton BelAZ dump truck has been mastered. This has notably reduced the weight of the truck.

In the development of tires with controllable pressure, consideration was given to the fact that the tire's adhesion to soft ground depends not only on the area of contact, but also on the form of the tire tread cleats and how they are distributed on the surface. The cleats should not shear the ground, and their configuration should leave a self-cleaning imprint in the ground. Use of tires with regulatable air pressure has made it possible to drive on roads which earlier were impassable for wheeled vehicles.

As part of the long-range increase in the operational capacities of tires with regulatable air pressure, radial tires with regulatable air pressure have been developed, and production of them has begun.



Tread patterns of tires with regulatable pressure (а) and wide-profile (б). (With the same load capacity) with a larger area of contact with the ground under normal pressure than in standard tires (в) equal to 1.7 and 2.8 times higher, and, with lowered pressure, 3.5 and 5.5 times less than normal.

It should be observed that an increase in the rigidity of the tread surface of the tire does not result in an increase in the rigidity of the tire as a whole. A casing with parallel positioning of the threads of the cord and with a reduction of the number of layers of cord, is significantly more pliant than the casing of a diagonal cord tire. This is why there is a large area of contact with the ground in radial tires with regulatable pressure, and, as a result, there is a more even distribution of pressure on the supporting surface under the tire. This increases not only the wear resistance of the tire, but also the gripping power of the tire on the supporting surface. As a result, the cross-country performance and reliability of the tire are enhanced.

Testing has shown that vehicles with such tires when moving at low air pressure may be driven more than 1.5 times faster. When using these new tires on asphalt surface roads, there are significantly less vibrations in the driver's seat than with conventional tires. The labor involved in mounting and demounting such tires is considerably less.

All of the types of tires discussed above have been developed for mounting on toroid rims without the lock ring used with split-rim truck tires. This has resulted in an almost 20 percent reduction of the weight of the tire, and it has reduced the labor in mounting and demounting these tires by one half.

When improving the design of tires, consideration is given to the possibility of recapping them during the time of their operational life, i.e., to their repairability. For example, replacing the worn out tread area extends the life of 6-7 million casings annually. Moreover, there is room for improvement in this solution itself. Use of the existing technology results in a great waste of materials, and recapped tires do not balance well. At present, only diagonal cord tires are recapped.

During the current Five-Year-Plan, there was carried out a series of scientific research efforts on the development of rubber for the tire industry solely on the basis of our native synthetic rubbers (Without use of any pure natural rubber). The experiments have indicated that such tires are equal in merit to pure natural rubber tires in terms of their operational performance (Including operation in a range of temperatures from a plus 55 degrees to minus 60 degrees Centigrade) and their resistance to puncture and cutting. Using exclusively synthetic rubber to produce tires with regulatable air pressure has enabled almost a doubling of the standard for guaranteed mileage for several types of tires, while at the same time the speed at which they were operated was raised by 25 percent. The guaranteed storage life for such tires has been doubled as well.

The specialization in tire production in the plants has been improved, and quality control of production has been established. On the basis of the scientific research and experimental design work, new construction materials have been introduced into the

industry, resulting in an increase in the technological level of production and a reduction in the labor in production.

Of course, all achievements in the design and production of tires may be completely effective only when there is a steady increase in the improvement of tire operational use.

THE ACHIEVEMENT OF SCIENTIFIC AND ENGINEERING PROGRESS IN ACTUAL PRACTICE (SEE TEKHNIKA I VOORUZHENIYE (ENGINEERING AND WEAPONS), NO. 2, 1986, FOR THE INITIAL ARTICLE ON THIS SUBJECT)

THE RESULTS OF THE SEARCH

Ye. Pateyuk

The scientific advancement that is occuring is universally known. Military materiel is systematically and continuously advancing in the state-of-the-art. There is also a tendency in the present phase of development to use both advanced design solutions and the latest types of materials. From the point of view of the military repairman, this means that the parts list of the repair resources is constantly changing (Frequently it is also expanding), and the technology is becoming more complex. And in order to be able to accept a new machine for repair tomorrow, one must be prepared for it today. One must not only know its design and the unique features of the improved operations accomplished in the machine, but also the appropriate means of developing the production system for it. The latter problem is frequently associated with the introduction of new technology, machine tools, and special equipment.

In essence, in any production system similar problems must be solved when a new type of production is being developed. But there is one fundamental difference in a military repair enterprise (Or a repair unit). Even in peace time, the time frame for the rebuilding of a new system of parts as a rule is established rigidly, and, moreover, no relaxing of requirements whatever with respect to the quality of repair are allowed. Military materiel must be ready for combat.

The conversation in the office of Colonel N. Pavlov, Chief of the Repair Enterprise was on this subject. This staff of Communist workers has consistently held a leading position in the socialist competition between associated enterprises for many years. It suffices to say that in the current Five-Year-Plan the unit has three times been awarded the Red Banner of the TsK KPSS [Central Committee of the Communist Party of the Soviet Union], of the Soviet of Ministers of the USSR, of the VTsSPS [All Union Central Soviet of Professional Unions] and of the VLKSM [All Union Lenin Communist Union of Youth].

The Chief Engineer of the enterprise, participating in the conversation, observed that the introduction of new technology opens principally new possibilities in repair operations. Moreover, it is desirable today to ask not only about the restoration of the service life of materiel, but also about

increases in the time periods between repairs (In contrast to established ones), if not for the machine as a whole, at least for individual components of the machine. Advanced methods of processing materials permits a significant increase in the durability of the parts, in their resistance to fatigue, and to provide the best protection for the processes of corrosion and rust. It is important to become very familiar with these techniques, and constantly expand their area of use. It is precisely from these concepts that we expeditiously set out to develop a separate area completely outfitted with new equipment for the rebuilding of parts.

..."The Metallic Coating Area" is a sign hanging above one of the doors on the ground floor of the Galvanizing Shop.

The Chief Engineer recalls with a smile: "We didn't take over that area on schedule without a struggle". The galvanizers persistently argued that there was no possibility of making room for the Area. But the most important fact was that they considered that no one should enjoy any luxury, i.e., to separate out a special facility for separate models of technological equipment. Now all have become convinced that the conflict was a waste of time. Not a single unit can get by without using that area today. We observe that the name of the area today does not completely reflect the nature of the operations performed in it in so far as there is equipment concentrated here which is not only for metal coating.

The Area occupies three relatively spacious rooms. A laser system is situated in one of them. It is intended for surface hardening of metal parts which operate in heavy-duty regimes. The operating principle of the system is based on the capacities of the laser beam to practically instaneously heat metal in a small area (A spot 4-5 mm in diameter) to a very high temperature and above the temperature at which a phased transformation of steel takes place. Moreover, the metal is heated to a very shallow depth, and immediately cools down as a result of the natural temperature exchange in the basic mass of the part. On the surface a thin layer (0.1-0.2 mm) is formed which has a fine-grain structure. The part processed in this way is moved around in such a way that the spot formed with each "shot" of the laser covers another untouched spot, and, as a result, an uninterrupted stretch of hardened metal is formed which possesses an increased resistance to wear.

The operational life of the part after such processing is lengthened 2-3 times. It is desirable to subject the bevels of valves of internal combustion engines to hardening, as well as the saddle of valves of the cut-off fittings of hydraulic and pneumatic cams on cam shafts and other similar parts. But it is especially useful to harden the working surface of cutting instruments and the dies and plunger dies of presses. The durability of the tool is increased, and the accuracy and precision of tooling the part are improved.

A "Kvant 16" was recently installed at the enterprise, and the economic impact of its introduction amounts to around 4000 rubles per year.

The equipment for a "Bulat 3T" installation is situated in the second room. We will discuss this in some detail since some enterprises have such equipment, and its introduction foretells of significant advancements.

The "Bulat 3T" installation (The Tallin "Dvigatel'" Plant produces it) is designed for surface hardening of metal parts up to 300 mm long and up to 130 mm wide. The hardening is accomplished by depositing a very thin layer of nitride, carbonitride or oxide of titanium, molybdenum, or zirconium on the surface of the metal, depending on what kind of metal is being used as an electrode.

The external base of the unit is reminiscent of one of the exhibits of the "Kosmos" Pavilion at the VDNKh [Exhibit of Achievements in the National Economy] of the USSR which displayed a large sparkling nickel spherical chamber with round illuminators. When the system is turned on, a multi-colored luminescence pours out.

The part being processed, an anode, is fastened inside the chamber in a special holder. An electrode-evaporator serves as a cathode. A powerful pump develops a high vacuum (10^{-5} мм mercury column). Then a very small quantity of nitrogen is let into the chamber (The process is called "inleaking of nitride), and the part is heated up to temperatures of 400-500 degrees centigrade depending on what kind of metal or alloy it is made of. After that, a high voltage is put on the electrodes, and a glow discharge arises during which metal particles, evaporating from the cathode, chemically interact with nitride pairs. They are then deposited on the part. The thickness of the deposited layer fluctuates from two to 20 micrometers. From a practical point of view, neither the configuration of the part nor the smoothness of the surface change, and yet the part takes on a new quality.

It was suggested that we try to grind off the surface which had been developed by this process. We tried with fine emory paper, both the dry and the wet type, with no results. The mirror-finish gold-colored surface was not in the least altered. A needle file just slips off of this surface. Such a hardness of the reinforced layer is, by the way, only a surface hardness, and the property of the basic metal does not change. Moreover, neither does it lose its strength. In this way, the "Bulat 3T" laser installation may be especially effectively used for the processing of a cutting tool (The service life of this tool between grindings is increased by 3-4 times), for the hardening of dies and plunger dies of presses, as well as for parts which are subjected to excessive wear.

The most spacious room of the area is designated for the restoration of parts by depositing of powder coatings. Here two

universal lathe tools have been installed. One is for preliminary preparation of the parts, and a UPU-3 [Expansion unknown] device is installed on the second system. Additionally, the work stations at which the restoration is carried out by the method of metalic coating of aluminum and iron parts are also properly outfitted.

It is well known that one of the typical defects, which arise during operation of the Type AO electric motor, develops in the bearing plates and in the hubs, pulleys, and similar aluminum parts of fans. The under surface of the bearing wears out as a result of which the support of the bearing is weakened. The traditional way of restoring such parts is well known, i.e., drilling out the bearing, and installing (Usually pressing) a replacement sleeve with subsequent reaming of it to the required dimensions. This is not complex, but it is difficult. It is more expedient, as the people here have found out, to restore the worn inside surface of the bearing by means of gas plasma deposits of an aluminum alloy with the MGI2-65 system. The installation is extremely simple in that, in essence, it is a common acetylene torch equipped with a device which feeds a two-milimeter wire of AMG-6 alloy into the flame. The wire melts, and particles of the metal are deposited on the worn surface of the bearing. After a layer of the desired thickness is developed, the bearing sleeve is bored out to a specific dimension. The installation may also be used to weld up cracks, pits, chip-outs, and similar defects on parts made of aluminum alloy.

Another special burner, the GN-1 (Developed by the VNII [All-union Scientific Research Institute] "Avtogenmash" [Expansion unknown], Moscow, permits the restoration of worn out steel and iron parts by melting self-fluxing powder compositions. For steel, powder of the brands SR-2, SR-3, and SR-4; and for iron, brands NPCh-1, NPCh-2, and NPCh-4 (The Scientific Production Association "Tulachermet" [Tula Ferrous Metallurgy Institute]) manufactures this device. The powder is sprinkled in a cylindrical feeder installed directly on the burner, and it is fed into the area of the oxyacetylene gas flame with an ejection influx. Melted particles of powder coming into contact with the surface being treated form a hard coating, the hardness of which, depending on the brand of the composition used, amounts to 30 to 55 . The coated part is then ground to the required operational dimensions. By this method the cross-shafts of universal joints, semi-axles, and collars also are rebuilt.

Plasma spray coating of metal powders is used not only in rebuilding worn out parts (sleeves, shafts, pins, etc.), but also to increase the wear resistance of working surfaces of newly manufactured parts, for example, the lugs and collars for the KrAZ-214 motor vehicle.

A mixture of argon and nitrogen is used as the plasma-forming gas in the UPU-3 plasma jet sprayer (The Rzhevka Electro-mechanical Plant produces this device). The PN55T45 and PN851-

015 brand Powders ("Tulachermet" is the supplier) are used for spraying steel parts. The particles of powder, falling into the plasma stream, not only instantaneously melt, but also take on a very high speed of movement as a result of which they penetrate the surface being rebuilt and are united together. The coating which is thus formed is easily ground and possesses a high degree of wear resistance and reliably retains lubrication. The basic metal of the part does not undergo any structural changes from a practical point of view.

"The Metal-Coating Area" to a certain extent is experimental in nature. New technologies are being tried here, and there is equipment here which is not in production use. At the same time, as we have already discussed, the mission of the area is not limited by this experimental work. The Area is actively engaged in on-going production. But the advanced equipment is used to a fair extent in other shops as well. Moreover, various models of plasma devices are in rather widespread use.

So, in the repair of air lines, ventilating fan impellers, parts incorporating housings, and other parts constructed of alloys having aluminum or copper at their base, as well as for welding of small parts of these alloys, the UPS-301 welding device is used. It is used to eliminate cracks and perforations, and to coat worn-out surfaces. The productivity of labor rose 2.5 times with the shifting over to plasma welding from soldering, and the quality of the bonds was significantly improved.

It is the nature of the production system of the metal-consuming enterprise that it often is necessary to reconfigure or completely manufacture anew the parts of a number of units of machines that are being rebuilt. With sheet-metal layout and pattern cutting in sheet steel, the APR-403 plasma cutting device has turned in a good performance, and it permits cutting ferrous metals at a rate twice as fast as an oxyacetylene cutting torch. The edges formed are more even, and the structure of the metal is changed less with the use of this device. Nonferrous metals may be cut in patterns also. And the machine has yet another substantive merit. When the device is used as a working heat-transfer agent, common compressed air is used in it, and the need for oxygen and a gas flame is eliminated.

People are widely familiar with the automatic gas-cutting device of the type like the ASSh which is used for cutting fugures out of sheet steel. The distinction of the suspended plano-photocopying machine (Model P K-2-4F-2 manufactured by the Kirovokansk Plant "AVTOGENMASh") is first of all that it is equipped with four cutters. Additionally, for this machine a gauge is not necessary, and neither is a magnetic head needed. The device "reads" a standard drawing, and, carries out the pattern cutting according to it, simultaneously outputting four articles in one operation.

Many parts, including all of the associated fasteners, are subjected to a galvanizing process. As is known, the quality of the galvanizing coating to a large extent depends upon how thoroughly the parts have been cleaned of dirt and grease. To this end, at the Enterprise The UZV [Expansion unknown] ultrasound cleaning device is used. Particles of dirt are removed from the parts by means of a cavitation which develops on the edge, the surface being rebuilt is sealed, and in this process even the smallest particles of powder are cleaned away. The introduction of such a technology has permitted not only an increase in the quality of the manufactured parts, but also it has substantly reduced the length of the manufacturing process.

And again, along with a simultaneous increase in quality, the productivity of labor on such a tedious operation as the removal of the seam from stamped thin-profile industrial rubber parts (Gaskets, oil seals, packing rings and other parts with diameters up to 25 mm) has increased more than three times. The production of a broad assortment of these items has been established for our enterprise. The removal operation is carried out on an NVUO-6 device (Produced by the Omsk Scientific Production Association, "Neftekhimavtomatika" [Expansion unknown]). The parts along with tiny metal needles are dropped into a chamber where they are frozen with liquid nitrogen to a temperature at which the rubber takes on a quality of brittleness. A special device creates a rotating magnetic field which attracts the needles to follow it. Fine membranes of rubber are struck by the needles and broken off of the parts, and the parts are rapidly and completely cleared of these seams.

Up until the present, we have discussed for the most part those successes in quality control which result in advanced technologies. But how are things going with respect to economy in production? The problem of economy for any enterprise, and all the more for a self-supporting enterprise is by no means easily laid to rest. The introduction of new technology is connected as a rule with invention and new equipment. Do such outlays justify themselves? Experience has definitely confirmed that they do. They pay for themselves with interest. Following are only a few examples.

The introduction of a laser-hardening technology of a hard alloy tool (At the "Kvant 16" installation) has yielded a 19,000 ruble economy effect, and from the introduction of metal workers' equipment for processing parts made of sheet metal (It consists of a sheet-bending machine and angular, guillotine, grooving, and compass shears), savings of 27,100 rubles. The device for the removal of seams from industrial rubber parts brings in an annual economy of around 3,500 rubles, and the suspended plano gas-cutting machine saves 7,000 rubles. The tool for testing internal diameters of rubber parts saves more than 11 thousand rubles. The total economical effect of the introduction of new technological equipment for only four years of the Five Year Plan consists of around 0.25 million rubles. Moreover, it is important to emphasize that the mastery of the operation of such

equipment amounts to only a part of the entire complex of enterprises for the introduction of scientifically organized labor at the enterprise (See the following data. During the years of the Five Year Plan, there have been introduced more than 450 innovations through the NOT [Scientific organization of the work] system; the economic result exceeded the expenditures on the introduction of new equipment and on processing; and 233 persons were conditionally removed from the ranks of those working in the basic production process).

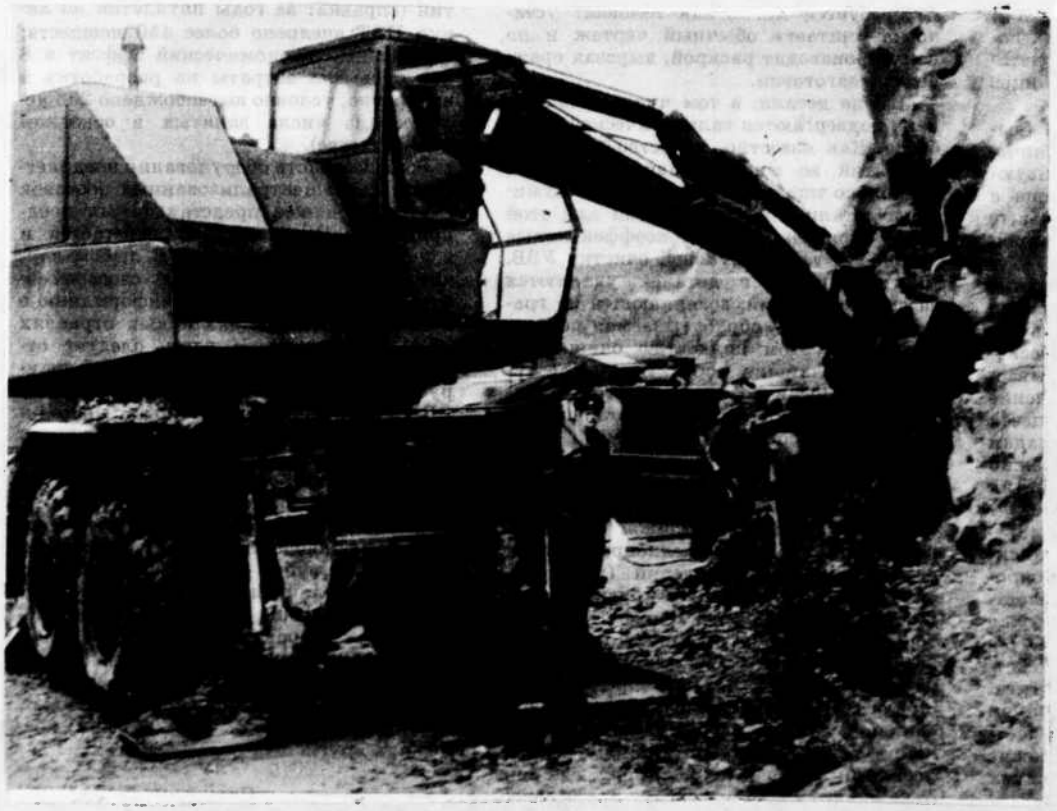
A large part of the equipment is introduced on the basis of centralized procurement through requests presented by the Enterprise. But many are obtained through initiative. In any situation, it is extremely important to receive timely and satisfactorily complete information about the innovations in the most varied branches of industry. And here it should be mentioned that, although the Enterprise is dislocated in the vicinity of Moscow, its association with the VDNKh [The Exhibit of Achievements of the People's Economy] of the USSR is maintained constant. Among the innovations introduced recently, an example is the device for removing the seam from industrial rubber products, the vibrating-finishing semi-automatic device, the PV-100C, a programmed-control manipulator (Model 7605) for automating press operations, a device for testing the internal diameter of reinforced gaskets, and elevatable shelving for storage of fasteners and other items.

OPERATIONS UNDER MOUNTAINOUS CONDITIONS

Colonel L. Migunov and Major V. Ol'shanskiy, Our special correspondents

> We will comply with the Decisions of the Twenty Seventh Congress of the Communist Party of the Soviet Union, and we will dependably defend the achievements of Socialism!

The heavy machine is halted at a turn in the narrow mountain road. A minute later, the upper engine begins to operate. The boom of the excavator, having gently raised a little, made a sweeping arc, and, with the bucket, came to bear against the foot of the bank. On the adjacent area, moving to the sharp command



To operate at a passing point on a narrow mountain road, frequently it is possible, when one has been able to only dig out an area from a cliff, to break up the rock beforehand with small explosive charges.

of an officer, troops mark off the locations of future dynamite holes, and the compressor station team turns on the pneumatic drills. The foreman of the detail checks on the activity with a stopwatch with respect to compliance with the standards. There is no commotion, no hurrying, and no unfortunate consequence -- the standard was met "excellently".

As is well known, successes do not occur of themselves. The apparent ease with which Lieutenant Colonel Yu. Krasutskiy's subordinants proceed, is the result of the concentrated work of the commander, of the political workers, the engineers and technicians, and all of the personnel of the Engineer-Sapper Battalion.

The distinctive conditions found in the high mountains leaves their imprint on the combat training and daily life of the soldier-sappers. The inadequacy of oxygen, sharp drops in temperature, and the practically impassable off-road terrain all make operations and the provision of engineer support critically difficult. So, at the training sessions of the units of the Battalion, it is necessary to break traffic routes, widen roads, facilitate crossings over rivers, dry gulches, and rock cliffs, and to construct inlets and exits more often than it is necessary to do such things under normal terrain conditions. Moreover, when accomplishing many tasks of the unit, sometimes individual crews operate at a considerable distance from each other.

This results in more strict requirements on each team and crew and on each soldier. Actually the general success depends upon accurate work on the part of each unit of the chain which reaches over the ravines and passes.

With consideration for these distinctive characteristics, in the Battalion an entire process of combat and political training is being developed. A particular significance is given to the completion of youthful development, to the qualitative training of specialists, to the uncompromising growth of their professional excellence, and to the assured development in the personnel of several associated specializations. A great deal of attention is being directed to psychological training and to the physical toughening of the troops.

In order to master a new specialization, we begin with the first days of service. An experienced instructor is appointed for each young soldier.

As practical experience has taught, the contribution of a comrade equal in title but more experienced is very effective, and it facilitates qualitative training of specialists in short time periods. A similar system of patronage allows the use of the maximum time period for training and, in particular, hours put in on the materiel when it is being serviced. The on-the-job-training instructor demonstrates how to accomplish any operation better and more quickly. It is worthwhile in this process that technical servicing problems, as a rule, are tied in

with themes of planned class technical training activities carried out on the previous day.

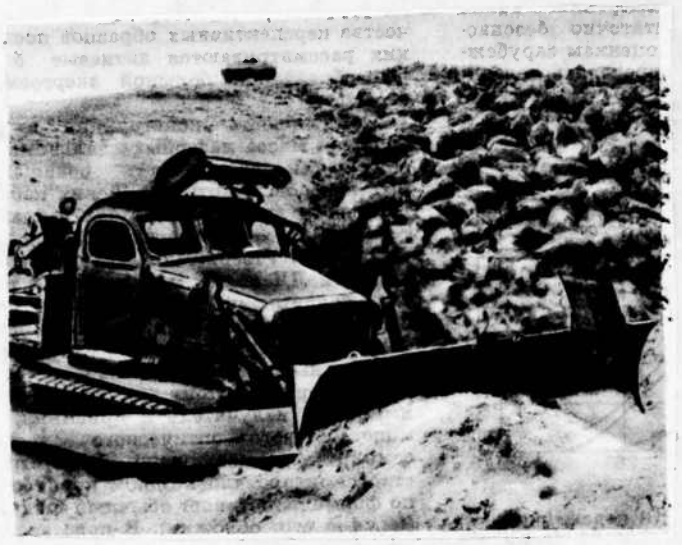
Other types of work directed towards the deepening of specialized knowledge is widely practiced. For example, competitions for the title of the best soldier in one's specialization, technical conferences on the exchange of knowledge gained from experience about technical advancements, and exercises engaged in by technical circles of troops proceed with great benefit and interest. Specialists of the services actively assist in organizing and conducting these activities.

The role of the officers in the control of the professional training of the troops is not limited only to participation in similar measures. For example, the Chief of Vehicle Service of the Battalion, Lieutenant D. Chikhladze, often carries out exercises himself with the drivers. The young troops are the subject of his special care. Not sparing the time, again and again he disects each complex problem with them. He discovers to what depth they now understand the design of a given system and whether they have come to grips with every special aspect of the operation of their vehicles. The lieutenant has driven thousands of kilometers on the route of the testing grounds and on mountain roads, working out the techniques of controlling a vehicle in actual practice with those under his charge.

A particular emphasis is placed in the Battalion on developing in the troops the special skills involved in the work under the actual conditions of the locality. The layout of the equipment park is completely appropriate for the needs of the driving course, and it incorporates all elements necessary for instruction in the conduct of a march in the mountains. Sharp inclines, downgrades, rock slides, and deep ravines are only some of the obstacles confronted in the layout.

In order to constantly control the activities of the trainees (In the mountains, even from the supervisor's observation tower, one can not see all of the exercises), all of the obstacles are equipped with information-return devices. The signals arrive from the transmitters at the supervisor's panel, and each error is noted.

In driver training, an emphasis is placed on the preciseness with which movements are carried out, even at the expense of the speed at which they are accomplished. Before they are allowed to begin driving in columns, troops should have completely mastered driving in limited passageways and handling a vehicle on protracted uphill and downhill movements and sharp turns, be able to control the machine smoothly on hillsides, etc. Such skills are particularly important for the future mechanic-drivers of heavy and oversize road-building and earth moving equipment and mechanized bridges.



A passageway has been made in a rocky barrier. Grading work has begun on the bed of the future road.

Actually, such equipment on a narrow mountain road frequently takes up three quarters of the roadbed. And under such tight conditions the crew must complete the assigned task quickly and accurately. Therefore, in the training of grader operators and the mechanic-drivers of route clearers and other materiel in the equipment park, locations are chosen which are characteristic of mountain localities as far as terrain features are concerned. The troops master the control of vehicles working on fissured cliff rocks, moving dirt on hillsides and slopes, and laying bridges on uneven rock surfaces.

In the Battalion, particular attention is given to the development of psychological stability during exercises under mountainous conditions. First of all, the young soldier is taught to overcome the natural feeling of fear which occasionally gives birth to a lack of confidence when driving vehicles and operating them. This is achieved through many training exercises conducted under dangerous circumstances. It is important that there be almost a complete interface of the man and the machine, i.e., the soldier be taught to feel the operation of each component or unit of the machine. At the same time, this confidence should not develop into its own form of self reliance and disregard for danger. The mountains do not excuse carelessless. Sometimes even the slightest mistake may lead to an irreparable consequence. Therefore, in the Battalion an attempt is made to develop a feeling of confidence in the troops, on the one hand, and, on the other, a constant sense of precaution.

In the Battalion, the technique of simulation is used in the exercises to approximate actual combat conditions. To create a definite tactical environment, typical points of activity in the combat setting are provided. Upon the command of the supervisor of the exercise, smoke generators and package charges are set off, and barrage strips are ignited from the control panel.

However, experience has shown that in order to prepare a person for exercises in the mountains, it is not enough to teach him only the movements of control of the materiel. Here at times it is necessary for the crews to operate under conditions when the trainee must make the decision himself, and he cannot count on quickly being helped by repair personnel when there has been an accident. Therefore, in the Battalion, there is no bemoaning time spent in training all of the troops to act on their own and with confidence in the most unexpected and complex situations.

Each sapper should be an excellent marksman, be proficient in the basic aspects of mountain training, be well acquainted with the local conditions, and be able to determine where the closest construction materials necessary to accomplish his mission are located and how to obtain them.

At specially equipped training points, the crews learn how to use devices for increasing cross-country performance of the materiel in the mountains, equipment for evacuating casualties and damaged equipment. They learn how to rapidly make and reliably set a stay, and how to correctly design and secure a block and tackle to pull out vehicles that are stuck. The mechanic-drivers are taught the methods of pulling a vehicle out by its own power and of using a track strip using materials at hand.

A great deal of time is allotted to the servicing of the components and units of the transmissions and runinng gears. Simple simulator-trainers are made by innovators in the training classes of the companies. The troops, learning on these, develop their initial skills in controlling main clutches or linkages, planetary and side-clutch steering mechanisms, other main steering mechanisms, and in tightening caterpillar-type treads.

An appropriate training site equipped with the necessary tools, devices, literature, and posters is also provided at the vehicle park for instruction of the troops.

One of the Socialist obligations of the personnel is the mandatory mastery of a related skill. A recent training exercise illustrates the value of the interchangeability of skills when operating under mountainous conditions.

A company commanded by Captain A. Vostrikov was faced with making a march of many kilometers at a significant height above sea level along a difficult route, and, then, to build a road within a short time period. Relieving each other at the controls of the heavy equipment, the sappers maintained a fast tempo

throughout the entire march. The unit arrived at the assigned area at the designated time, and quickly began building the road. It was necessary to operate under extremely difficult conditions. The paucity of oxygen at altitudes above 2,000 meters, where the engines of the vehicles overheat and lose their power, also affected the working efficiency of the people.

The Battalion Commander, Lieutenant Colonel Yu. Krasutskiy.

However, the equipment operated for 20 hours without stopping. A well organized interchanging of skills in the units and teams also aided in the achievement of this success.

It should be observed that the sappers would scarcely have been able to withstand such stressful conditions for this extended time with such good health if they had not been seasoned through systematic and intense training. They have to their credit many kilometers of short forced marches over broken terrain, armed cross-country runs, and exercises in obstacle negotiation and in mountain climbing.

A significant portion of the time devoted to planned exercises in physical fittness and group sports is taken up by problems developing strength and reaction speed in general as well as a special quality of endurance.

In the new training year which has actively been included in Socialist competition under the motto "We will comply with the Decisions of the Twenty-Seventh Congress of the Communist Party of the Soviet Union, and we will dependably defend the achievements of Socialism!", the sapper troops will apply all of their strength to the accomplishment of their obligations.

CONDITIONS, PROBLEMS, AND LONG RANGE PERSPECTIVES

LASER RANGE FINDERS

Major A. Paisov and Captain A. Tsarev

The foreign press expresses the concept that a particular significance is attached to range-finding systems in the future optimization of weapons fire. At present, these systems are being installed on many types of weapons and combat materiel. It is reported that the present optical and laser range-finding devices in use in armies enable the solution of a wide range of tasks including target identification and location by intersection, the measurement of distance to targets, and effective observation of destruction on the battlefield.

In contrast with LD [Optical laser range finders], as foreign specialists note, these range finders make it possible to practically instantaneously (Within fractions of a second of time) and with great accuracy (Up to 5 meters) determine the distance to the target. They are relatively simple to operate, they are compact, and they have small dimensions. The most recent achievements in the area of quantum electronics and the continuing process of microminiturization of the elements of the equipment base is opening up broad horizons for future improvement of LDs, including their being integrated with various types of instruments.

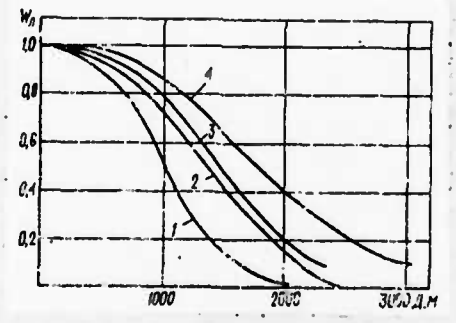
However, it also is noted that LDs are dangerous for the organs of vision of the operator, especially if he is doing his observing with optical instruments. Also among the deficiencies of the LD is the influence of the clarity of the atmosphere on the distance of effectiveness of the LD. Dust, smoke, and atmospheric residue sharply reduce the capacity of instruments to determine distance.

The high probability of wearing away of the instrument caused by accidental reflection of the laser beam off of nearby subjects and irregularities of the terrain is considered a substantial deficiency of the LD.

Striving to make the organs of sight of the operator of LDs secure from damage, foreign specialists are planning to use laser transmitters with long emission waves up to two MKM [Micromicron] and longer in future instruments. In their opinion, that will also provide better passage of the emissions through the atmosphere under various weather conditions, and at the same time it will increase the possibility for secrecy in the operation of the LD. So, in several advanced models of such instruments,

holmium lasers are used, and they are competing with lasers on an IAG [Uttrium-aluminum garnet]. Most of the present LDs are built on IAGs. The main advantage of holmium lasers is considered to be their practical safety for the organs of sight which are especially important during tactical training and exercises for personnel of artillery units.

According to data in the foreign press, present laser range finders are equipped on a base of glass with neodymium and IAG, and they have a frequency of pulses less than one cycle per second. They afford measurement of distant only to motionless targets or vehicles moving at slow speeds (Around 10-15 kilometers per hour). For measuring the distance to high speed targets (Airplanes, helicopters, and others) it is considered effective to use LDs constructed on a base of semiconductor lasers (For example, on an arsenide gallium base) which possess a capacity for high frequency of measuring cycles. Such instruments, which are safe enough, according to foreign specialists, are capable of determining distances in a range from 30 to 6000 meters with a frequency of pulses at around 1000 cycles per second.



A comparison of the probability of hitting a stationary target when firing from a tank gun using the long-range type of systems which, when developing the initial data, use: 1 the standard sights, 2 a stereo range finder with a simple calculating machine, 3 a stereo range finder with an electro-mechanical machine, 4 a system for fire control on a tank by use of a laser range finder.

The possibility of using lasers on a base of carbon dioxide gas with a long 10.6 micromicron emission wave is being actively researched. According to the opinion of foreign workers, these lasers are dangerous for the organs of sight, and they have better atmospheric signal penetration characteristics when compared with those of existing systems, and this includes their

use in mist and fog.

Abroad, a great value is placed on reducing the size and weight of the instruments. One of the ways of solving this problem is seen to be in the conversion to use of new active elements which are developed on a base of rare-earth metals, for example, thulium, erbium, holmium, etc., in the laser emitters. A low power crest, thanks to which these lasers do not need a large supply of current, is among the distinctive characteristics of such lasers.

Further, it is considered that increasing the sensitivity of the photoreception devices leads to a reduction in the weight of the LD, which allows, in turn, a significant reduction in the power of the emitted energy and in the corresponding size of the power source devices. Use of silicon diodes with a sensitivity of not less than 10^{-9} volts is planned. Foreign specialists consider that a reduction in the size and weight of the LD may also facilitate the use of laser-excitation capacitors and current source devices with better specifications. Lithium batteries which possess a high energy capacity are considered as foremost examples of current-source devices with better specifications.

Portability in design and small weight of laser range finders has facilitated their being used by forward artillery observers and by the personnel of ground forces observation posts. The prediction is made that in the future these LDs will completely replace the traditional binoculars being used for observation. Foreign specialists consider that the LD of that type with the optimum design is an instrument consisting of a range finder with an emitter and a receiver and a monocular optical 7-power viewfinder. The entire device is mounted in one housing and is reminiscent of an ordinary set of binoculars in shape (Look on page 171). In the field of view of a supplementary eye piece, a digital display device is installed on a light emitting diode. The results of the measurements are displayed on the face of this diode. The process of measuring the distance to the target using this range finder requires around one second.

There are plans to use a laser on an IAG activated by neodymium with an emission power of one milivolt. The developers propose use of a silicon photodiode as a receiver of reflected laser emissions. An optimum clarity of illumination of the display is chosen, turning the mounting of the supplementary viewfinder. For the protection of the organs of sight of the operator, a light filter is introduced into the optical system of the LD, which transmits the emissions of the visual portion of the spectrum. A special device is used to change the minimal distance of action of the instrument either smoothly or in degrees. If the target is located nearer the set minimum distance of activity of the LD, on the digital face of the display a conditioned signal appears in the form of lit up points. In the LD, a special electronic chart for counting the

number of reflected pulses is provided in connection with the fact that a lit up point may appear on the display as a result of the reflection of a laser beam off of false targets, for example things in the area of the range finder. In the opinion of foreign specialists, this makes it possible to preclude the incursion of false signals reflected from nearby things into the photo-reception device.

The process of measuring the distance to the target with an LD is accomplished as follows. The operator guides the cross-hairs in the view finder onto the target, and presses the range-measurement button. The result of the measurement is displayed on the display device within 3-5 seconds. It is noted that the operational regime of the instrument is an economical one, and it is possible to make up to 600 measurements without recharging the current source.

Abroad, a great deal of attention is paid to broadening the range of use of the LD, resulting in their being integrated with instruments having other uses. According to reports from the foreign press, an integrated circular scanning system is in the development stage. This system unites a laser range finder with a passive night vision instrument. It is believed that this system will afford both determining the distance to the target and its angular coordinates, as well as carry out illumination of the target with the laser beam for the locking on of the guiding nose cone of a highly accurate weapon.

One of the laser range finder-target indicators is expected to be used for determining the distance to targets, illuminating them with the laser beam, and guiding tactical fighter airplanes to them. The information about the range and the angular coordinates of the target should be displayed on the digital face of the display device of the optical view finder. It is noted that, in the case when this system is joined with an infra red night vision device, the resultant system may be used for solving range finding problems, both during the day as well as at night.

Abroad, the equipping of armored tank vehicles with LD has undergone large scale development. The time required to get ready for firing has been significantly decreased, and additional conveniences have been developed for the process of firing from a tank gun. In order to reduce the size of the LD, it is considered expedient to integrate the instrument into the same unit as the sight. Such instruments have been given the name LPDs [Laser sight-range finders]. In contrast with artillery LDs, in the tank LPD the measured distance to the target is input to the ballistic computing device in the fire control system of the tank, which, according to the foreign developers, permits the probability of hitting the target on the first shot to be substantially increased.

Foreign developers pay a good deal of attention to standardizing and unitizing the various components of the LD. It has been reported that a range finding module has been developed

on the base of which it is planned that a whole family of LDs for various applications will be produced. Foreign specialists consider the most advanced way to accomplish this is through the development of standard modules which would enable the assembly of range finders having various target assignments. Additionally, it is noted that such a technical solution facilitates a significant increase in the reliability and operational ease of repair of LDs (Especially under field conditions), and at the same time the cost of manufacturing them would be reduced.

One of the basic problems in the further optimization of the LD,, in the opinion of foreign designers, is the elimination of the possibility of the instrument responding to invalid targets (Local subjects and unevenness of the terrain) which may be situated along the line of observation. It is considered that this task may be solved specifically by the use of special electronic system allowing either the smooth or step-wise limitation of the minimal distance of action of the instrument. In this, the operator may, according to his perception, turn a crank to increase the so-called dead zone in the instrument, and, in this manner, preclude the possibility of response of the LD to objects situated closer to the target.

Installation on the LD of special electronic panels which automatically control the intensification and permit a maximum increase in power of the signals reflected from the most remote targets is seen as another way to optimize the LD. In this way, a tuning away of the range finder from interference occasioned by reflection of the laser beam from small objects (Branches, wires, and other objects) situated in front of the target. One more possible route to solve the problem is considered to be the use of digital displays with special conversion devices providing a simultaneous or sequential reading of the distance from several objects. This affords the possibility of speeding up the selection of the true distance to the target by the operator. It is noted that in this case it is possible to reduce the probability of false reporting of subjects situated in front of the target.

In the tank LPD for control of the accuracy of the measurement of distance and increase in the reliability of the results received, use of a number of special methods is planned. So, in one of the instruments in the field of view of the gunner an elipse is displayed. The measurements of the axes of this elipse are proportional to the length and height of a tank with known dimensions. The dimensions of the elipse change back automatically in proportion to the measured distance. If the image of the tank is drawn accurately in an elipse, the distance to the target has been accurately determined.

In another tank aiming system, the LD is integrated with an optical base. A comparison of the results of the measurement of the distance derived through using optical and laser range finders has afforded the possibility of reducing the probability

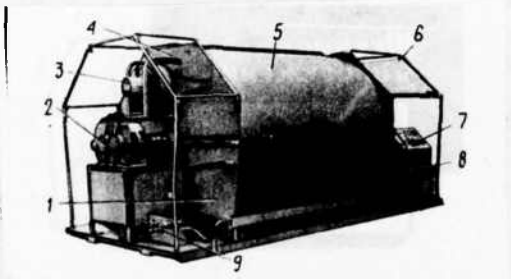
of errors in the measuring. However, in this case, according to the evaluation of foreign specialists, the time required to develop firing data substantially increases.

This article is based on information from the foreign press.

A CLEANING MACHINE

Lieutenant Colonel A. Avuza and Lieutanant Colonel V. Silayev

This new machine 038.4920, designed to clean away various types of soiling from parts and units of motor vehicles (With the exception of carbon and scale), is being output in a movable repair system to replace the MN1M jet machine. The machine is designed for using of new synthetic cleaning fluids including the water solutions "Labomida-203", MS-15, ML-52 (Concentrate of 25-30 Kilograms per cubic meter).



The machine (See drawing) consists of a tank 1, a roof 4, a ventilation system 3, a drive mechanism 2, and a control panel 7. The tank and roof form a cleaning chamber, inside of which a rotor mechanism with three magazines suspended from it is situated. The walls of the chamber are double with heat insulating packing made of slag cotton.

The tank is divided into two sections, one for washing and one for cleaning. In the washing section, tubular steam heat exchangers are installed and connected to hose fittings 9, a supply line for steam and a drainage line for condensation. Cleaning of the washing solution is accomplished by pumping it through a settling tank. Here individual mechanical mixing actions and oil injections take place which are periodically removed through special fittings. The pump installation supplies the tank with water, and pumps out the washing solution.

The opening through which the magazines are loaded is closed with a segmented type of valve 5. It is opened semi-automatically or by hand with a crank 8. The ventilation system consists of two fans and soft-walled air ducts.

A two-speed electric motor driving a reduction gear with a V-belt supplies the drive to the machine.

Basic characteristics	Values
Productivity in kilograms per hour	900-2000
Volume of washing solution in cubic meters	5.5
Operating temperature of the washing solution in degrees centigrade	85-95
Steam used in kilograms per hour:	
for reheating the washing solution	510
for maintaining the temperature	155
Maximum dimensions of parts being cleaned, in milimeters	2300X600x400
The rated voltage in kilovolts	10.2
Dimensions in milimeters	5000X2400X2400
Weight in kilograms	5200

The start-control system is located inside the control panel. On an upper panel are installed a thermometer which indicates the temperature of the solution, and a manometer of the pump installation as well as buttons and switches controlling the drive, the ventilation system, the pump installation, and the valve.

The machine may operate in conjunction with the PPK-400 or the PPK-700 steam boiler. It is transported on a MAZ-8926 trailer. For loading on this trailer a take-down yoke and lashing equipment are provided. When in the transporting configuration, the machine is covered with a tarpaulin placed over the framework 6.

STUDY AND OPERATION

PREPARING THE T-72 TANK FOR SUMMER OPERATIONS

Lieutenant Colonel P. Balashov and Captain N. Zinkin

During the preparations of tanks for spring and summer operations, in addition to the TO-1 or TO-2 [Routine automatic type of technical servicing] supplementary work is also accomplished.

The anti-freeze coolant in the engine cooling system is replaced with clean (Without mechanical contamination) fresh water with a three-component additive. In order to drain the anti-freeze from the cooling system, the tank is parked on a horizontal surface or on a surface sloping to the left side, the caps cover for the filling openings, and the plugs in the overflow tank and the radiator, as well as the coolant drain plug in the access opening under the engine are then unscrewed. The plug for the draining spigot is unscrewed, and a fitting on the end of a hose, which is in the ZIP [The set of spare parts, tools, and implements] of the tank, is screwed in. In order to remove the anti-freeze more completely, after the draining has stopped, the frame with the radiators is raised, and the crankshaft of the engine is spun by the starter-generator for 3-5 seconds without any fuel being fed in. Then the plug on the drain spigot is screwed in, and the opening under the engine is covered over.

The three-component additive is used for reducing the scale buildup and for protecting the parts of the cooling system from corrosion. Fifty grams of each component of the additive, potassium bichromate (potassic bichromate), sodium nitrite, and trisodium phosphate, are dropped in small portions into a container containing water (8-10 liters) heated to a temperature of 60-80 degrees centigrade, carefully mixed as water is added (So that 100 liters of liquid is prepared). The system is filled by using a funnel with a screen. When pouring through the radiator opening, the filling opening of the overflow tank should be open. In order to speed up this operation, one may pour liquid simultaneously into the radiator and into the overflow tank. With a completely filled cooling system (The capacity is 90 liters), the liquid level should not be below the lowermost threads on the fittings on the filling openings of the radiator and overflow tank. During the process of operating the tank, when the coolant in the system is low, for the sake of convenience, the solution of the three-component additive is poured into the system in its initial concentration. Permission is given also to bring a cooling system up to the full level with

clean water if the radiator can be brought up to full by adding not more than 3-5 liters to it.

After filling the cooling system, the condition of the rubber gaskets under the plugs and caps (Those that are bad are replaced) is checked. Having tightened the plugs of the filling openings of the radiator and overflow tank, and moved the "water - antifreeze" switch on the instrument panel of the mechanic-driver to "water", one should start the engine and operate it for 1-2 minutes. The level of the coolant is checked, and, when needed, the system is brought up to the full level. Then, the plugs in the filling openings and the caps cover above them are closed.

The next tasks consist of cleaning the PVK [air-vapor valve] and checking its adjustment. The PVK is disassembled, cleaned of scale, and put back together, replacing the gaskets if required. The preciseness of the adjustment of the air-vapor valve is controlled with a PPGU [Universal instrument for testing of hermetic tightness] tool*.

The observing and sighting instruments of the GPO [Pneumatic cleaning] system are blown out using air pressure for 10-15 minutes while repeatedly pressing down on the valve lever. Then 7 liters of clean water are put into the tank of the GPO system of the observation instruments and 2.2 liters are put into the tank of the GPO system of the sighting instruments.

The arctic (Winter) fuel in the engine fuel system is replaced with L-0.2 (GOST [All-Union State Standard] 305-82) summer diesel fuel. Before doing this, one must remove the sediment from the internal fuel tanks, i.e., drain 3-5 liters of fuel from the forward rack-tank, the middle rack-tank, and from the left front tank.

The preparation of the engine air-intake system consists of installing the summer air intake channel, carrying air to the air cleaner and routine servicing of the air cleaner. In order to install the summer channel, one must remove the cap of the air influent window in the cover above the power installation, place it in the tank ZIP box, and tighten the bolts in the boom on which the cap is fastened.

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* See Tekhnika i vooruzhenie, 1982, No. 10.

Before the air cleaner is removed for servicing, the dust and dirt is cleaned from it and the protective screens are blown out around the dust protective system (And in the accessible places in the intake tubes of the system), as well as are the protective screens and the outside of the air cleaner housing. Having removed the air cleaner, one must immediately install the seal which is in the operational set to prevent foreign objects and dust from entering the air intake manifold.

The servicing of the air cleaner is carried out using the stands from the MTO-80 (MTO-172) set or with the specific equipment (The V.MTO.2-39sb Unit and the V.MTO.2-40sb Stand).

We would like to direct the attention of the specialists in this area to the fact that the quality of the cleaning of the filter cartridge is determined by weighing the lower cartridge. If it weighs 10 880-10 980 grams and less, the entire set has been thoroughly cleaned.

When assembling the air cleaner, the felt seals installed in the shell of the top of the cover and of the cartridges should be coated with ONaKa-3/10-2 Grease. Install the cartridges according to the designations "Lower", "Middle", and "Upper" to the side of the supercharger of the engine, and fasten them with the bolts. Tightly mate the cover with the top of the air cleaner, tightening the screws of the fastening device evenly, and not allowing the collar on the cover to be warped. The cover should surround all of the centering cleats on the top, and make a satisfactory seal on the entire perimeter of the felt washer.

Then a check is made of the device for warning of excessive resistance in the air cleaner, for purposes of which a rubber receiver from the warning device is hung on the transmission tubes of the sound warning device in such a manner that it covers over the radial openings in the tube (One must make certain that the internal surface of the tube is clean!). When a small excessive pressure is created in the receiver, a signal lamp "VO" [Expansion unknown] on the instrument panel of the mechanic-driver comes on. When these details are completed, the engine is started again, and it is allowed to run 10-15 minutes at a crankshaft speed of 25-16.6 seconds (1500-1600 rpm). This is done in order to remove all of the winter fuel from the fuel lines and filters. At the same time, the tightness of the fuel and air intake systems of the engine is checked.

The operational capacity of the filter-absorber and the tightness of the air passage of the filtering and ventilation device in the system for protection from weapons of mass destruction is monitored. All hatches are closed, the supercharger is turned on, and, having put on a gas mask (Having first checked it), a rag is held for one minute at the armored protector of the valves of the super-charger. The absence of any smell in the tank will be evidence that the filtering and ventilation device and the hermetic seal of the air tract of the FVU [Filtering and ventilation system] are in working order. The total time taken up in pumping air through the filter need not exceed 10 minutes.

Further, the charge of the cylinders of the PPO [fire-extinguisher system] and of the hand fire-extinguishers is checked, as well as is the operational performance of the electrical circuits of the PPO system. The degree to which the cylinders are charged is determined by a weight test. The difference betwen the actual weight and the indicated weight on the identification plate on the cylinder may not exceed 10 grams. If it does exceed this amount, the cylinder or fire-extinguishing system should be exchanged or recharged.

Testing of the operability of the electrical circuits of the PPO system is carried out in a sequence. The current is turned off, the cover over the electrical power transmitter is opened, and two plates of the fan baffle system are removed. The union nuts are loosened, and the electrical leads are removed from the heads of the cylinders of PPO No. 1 and No. 2 in the power

section and from cylinder No. 3 in the combat section. The valves of the air cylinders are opened, and the PK11-1 instrument is connected to the receptacle plug and socket unit ShB of the B11-5-2C1 Unit, and the cut-off and transfer switches of the P11-5 panel and the PK11-1 instrument are placed in the output position. After this, the PPO-OPVT transfer switch on the P11-5 panel is moved to the PPO position, the TD(1-10)-TD (11-15) transfer switch of the PK11-1 instrument is moved to the TD(1-10) position, the 1B, 2B, and 3B cut-off switches to the "Off" position, and the TD-PPO switch is moved to the "0" position.

When the current is now turned on, if the electrical circuits are sound, the 1B, 2B, and 3B lamps of the explosive charges should not burn. When disconnecting the battery, and then after switching on the 1B, 2B, and 3B switches of the PK11-1 instrument, with the feeding of current to the 1B, 2B, and 3B lamps on the P11-5 panel should burn weakly. This evidences that the electrical circuits of the explosive devices on the cylinders of the PPO are in operable condition.

The good repair of the PK11-1 instrument is checked by depressing and releasing the "Test" button of the instrument. Then the "Test" lamp should come on, and, after 5-7 seconds, it should go out.

In order to check the TD1 temperature sensitive element, the TD-PPO transfer switch of the instrument is moved to the "1" position, and the "Test" button is depressed and released. The "test" lamp starts to burn, and goes out in 2-7 seconds. After this, lamp 1B30 of the PK11-1 instrument starts to burn, and goes out in 0.5-3 seconds, the lamp 30 on the P11-5 panel starts to burn, and lamp 1B goes out, and a command is issued by the MOD [Engine stopping mechanism] and in 0.5-3 seconds the command is taken off. Fifteen seconds after the Lamp 30 of the P11-5 panel starts to burn, is depressed and then the button "Reset" on that panel is released. As a result of this, the PO Lamp of the P11-5 Panel should go out, and the supercharger is started.

The temperature-sensitive element TD2-TD4 is tested in a similar fashion with a sequential installation of the TD-PPO switch of the PK11-1 Instrument in the "2", "3", and "4" positions. When the TD-PPO transfer switch is moved to the "2" and "3" positions, and with depression of the "Test" button, the 2BPO and 3BPO Lamps of the PK11-1 Instrument come on and go out, and the Lamps 2B and 3B of the P11-5 panel go out. When the transfer switch installation TD-PPO is in position "4", the "Test" button is depressed, the PO Lamp of the P11-5 Panel starts to burn, the super-charger is stops at the time the lamp is burning, and the system operates further the same way as when TD1 is being checked.

If then the current is cut off, Lamps 1B, 2B, and 3B of the panel start to burn dimly.

In order to check the temperature-sensitive element TD6, the TD(1-10)-TD(1-15 Transfer Switch is moved to the TD(1-10) position, the TD-PPO Transfer Switch of the PK11-1 Instrument is moved to the "6" position, and the "Test" button of the instrument is depressed and released. The "Test" lamp starts to burn, and goes out in 2-7 seconds. The transmitter is operating correctly if, after this sequence, the Lamp 1B30 of the PK11-1 Instrument starts to burn and goes out 0.5-3 seconds, Lamp 30 on the P11-5 Panel starts to burn, and Lamp 1B goes out, and a command from the MOD is issued, and in 0.5-3 is taken off.

Fifteen seconds after Lamp 30 of the P11-5 Panel starts to burn the "Test" button on the same panel should be depressed and released. Lamp 30 goes out, and the blower is started.

The temperature-sensitive elements TD7-TD10 are also checked, but with subsequently placing the change over switch TD-PPO of the P11-1 instrument in the "7"-"10" positions. Since by placing the change over switch TD-PPO in the "7" and "8" positions and pressing the button, "Test" lights up, and, within 0.5-3 seconds, the Lamp 2B30 (3B30) on the PK11-1 Instrument goes out, and also lamp 2B (3B) of the P11-5 Panel goes out. And, after placing the change over switch TD-PPO in the "9" and "10" positions and pressing the "Test" button, Lamp 30 of the P11-5 Panel comes on, and the blower stops while Lamp 30 of P11-5 Panel is burning, and the blower stops while Lamp 30 is burning. Further, the system operates in the same manner when Transmitter TD6 is being checked.

If one disconnects the blower and battery, and then turns on the current again, the 1B, 2B, and 3B Lamps on the Panel should burn dimly.

The temperature-sensitive elements TD11-TD15 are tested in the same sequence, only the transfer switch of the temperature-sensitive elements is moved to the TD-(11-15) position, and the transfer switch TD-PPO is subsequently placed in the "6"-"10" positions.

After checking the electrical circuits of the PPO system, it is necessary to switch off the blower and the current, disconnect the P11-1 Instrument from the B11-5-2C1 Unit, connect the union nuts with the electrical wires to the heads of the cylinders, lock the nuts on, introduce the MOD, install the packing on the housing of the MOD, install the plates in the fan shield in to place, and close the cover over the power transmitters.

While working with the PK11-1 instrument, one must remember that he must not depress the "Test" button sooner than 15 seconds after the "Test" lamp of the instrument has gone out. Ons should not move the TD-PPO transfer switch while the "Test" Lamp is burning.

If the "Test" Lamp does not go out in 2-7 seconds when a circuit of the transmitter being checked is out of commission,

after 10 seconds the "Reset" button of the instrument should be depressed and released, and, after this, the "Test" button should be depressed and released. During the check of the temperature-sensitive elements TD1-TD11, the FBU valve of the FVU should be shifted to operate through the filter-absorber.

After accomplishing the assigned test operations, the tank weapons are serviced. The bores of the barrel of the gun and of the machine guns are cleaned using RChS [Expansion unknown] solution. When RChS is not available, diesel fuel or kerosene may be substituted (Let us remember that RChS solution is toxic!). If any centers of rust are noticed in the barrel, it must be carefully cleaned again. When one checks a twin machine gun, one must definitely carefully check for the presence of cotter-keying and seals on the screws of the aligning mechanism and on the position of the gas regulator (It should be in the "1" position). The gap between the support and the rear wall of the slide guide should be 14-18 mm.

After inspecting the bore of the barrel, it is lubricated with MS or GOI-54p grease, and the mechanisms and moving parts of the machine guns with KRM (TU 38.401196-77) grease or RZh liquid rifle grease. The unpainted parts of the weapons (The muzzle face, the test surface, the slot for the wedge, etc.).

Next, the mechanism for venting the gun is serviced using diesel fuel (Or kerosene). Orifices and openings are cleaned with a cloth wound around a wooden stick. After cleaning the parts of the venting mechanism and the parts of the barrel under the receiver, it is wiped dry, and coated wit a thin layer of MZ (GOI-54p) grease. The beach block is partially opened.

When necessary, the surface of the cradle and shaft gear of the lift mechanism may be cleaned with a cloth soaked in kerosene or diesel fuel while not permitting any of the fuel to spill into the mechanism. The parts that have been washed are wiped dry, and then all unpainted places are wiped with a cloth soaked with MZ(GOI0544p) or TsIATIM-201 grease. The slides under the breach and the lift mechanism are covered with TsIATIM-201 grease using a 2A20.Cb.41-58 grease gun from the gun ZIP.

There is one more necessary operation in the servicing of the machine. All leather straps should be coated with castor oil.

INSPECTION OF AN ANTI-TANK GUN

Colonel V. Buyanov

The MT-12 Gun, like any other weapon, should always be ready for combat use, but immediately before firing and if circumstances permit, one should nevertheless check all mechanisms. The inspection and check of a weapon, as experience has taught, is best carried out in a certain sequence of steps.

The barrel is lowered to a horizontal position, and the covers are removed. Then, the gun is put in battle position, and a check is made to see if it is loaded. After this, the breech block should be opened, and the bore of the barrel inspected and cleaned of carbon, dust, dirt, and surplus grease. The bore of the barrel should be wiped with a swab, having previously wound a dry cloth around the brush. The breech block should be partially disassembled, and all of its parts should be cleaned, and a thin film of grease applied to them. The breech block should then be reassembled, and it should be assured that the protrusion of the firing pin (2.0-2.38 milimeters) should be confirmed with a gun gauge. The surface of the tube should be carefully inspected and assurance be made that there are no bulges, deep scratches or nicks on its surface.

After this, the bore of the barrel, the locking recess of the breech ring, the chamber, and the driving part is inspected. In order to throw better light upon the surface of the bore of the barrel, use of a white sheet of paper by positioning it on a slant in front of the muzzle part is recommended. Cracks and bulges in the tube are not allowed. When there is suspicion that a crack is present, the paint must be removed and the questioned area must be carefully inspected. A crack is easily distinguished on the shiny surface of the bore of the barrel as a dark zig-zag shaped line.

In order to determine if it is a crack or a scratch, one may use a simple procedure. Pass a needle which has been attached to the end of a thin stick over the suspicious place. The needle will get stuck in a crack, but it will only lightly along in a scratch. A bulge is detected by a thickening on the surface or by a shadowy ring inside the barrel. Dents which do not extend into an inner bulge and do not reduce the soundness of the barrel are permissible. After the inspecting the non-painted external surfaces and places where the paint has been damaged, they are painted.

Further, the operation of the breech block mechanism is checked, opening and closing it several times. When the breech block is open, the wedge should freely move down and securely be

held in position by the upper cams of the extractor. Then, press on the extractor lever, and the wedge sharply closes. If this action is not rapid enough, by turning the regulating screw, the closing spring of the semiautomatic action is compressed. Attention is also given to the condition of the grease, which, if it is thick and in abundance, can cause the breech to operate sluggishly and encumbers the empty-shell extraction process. The release of the firing pin by the firing handle or by a duplicator of the release is carried out after each closing of the breech, and at this time there should be distinctly heard a sharp sound of the impact of the shoulder on the ledge of the recess in the wedge should be heard. The firing lever and the duplicating lever should rapidly return to their initial position.

The action of the safety catch which guards against firing when the breech is not completely closed should be checked. To this end, the breech is just slightly opened, and pushing on the firing handle, one confirms that release of the firing pin does not occur.

One must pay particular attention to the place where the rods of the brakes against recoil and recuperation are fastened in the openings of the cradle as well as the cylinders of the anti-recoil mechanism to both barrels. Check as to whether all plugs and valves are screwed in evenly, and whether there is a flow of liquid through the sealing equipment or through the openings for the plugs and valves. If there is a leak, its cause must be eliminated. The recoil-indicating ruler should be clean and not contain any dents or bends, and the cursor of the rule should move with a little friction (Three-four kilogausses).

After the inspection and elimination of defects of the cradle and anti-recoil mechanism, the amount of liquid in the recoil and recuperator brake as well as the pressure in it is checked. A deficiency in the liquid leads to lengthening of the recoils. An excess of it in the recuperator leads to sharp recuperations, shortened recoils, and a loss of stability in the weapon during reccoil and recuperation.

The amount of liquid in the recoil brake is shown by its level in the test opening when the barrel is in the horizontal position, and the level in the recuperator by a graphic representation of the recoil. Liquid and air are added with a pneumatic-hydraulic pump. The upper saddle is inspected by proceeding successively from the trunnion seats to the base. There should not be any cracks on the saddle, and all bolts and nuts should be securely tightened and locked.

The elevating and turning mechanisms in the full range of vertical and horizontal angles of adjustment should operate freely, without jerks, or jammings, and the effort expended on the handles of the handwheels should not exceed 6 kilogausses (Measured on a dynamometer).

The counterbalancing mechanism is checked at the same time as the elevating mechanism is checked. It should require approximately the same effort on the handheel handles as the elevating mechanism when adding angles of elevation and declination to the barrel. If that does not take place, it should be regulated according to the Operation Instructions.

When checking the trails, attention is directed to the correctness of their union with the trail. All of their parts are inspected sequentially, and, in this process, assurance is made that there are no cracks, and that the rules may be adhered to in both the firing and travelling positions. During the course of the inspection, the trails should be split and brought together. They should come together and spread apart without expending excessive effort and should be reliably secured in position both in the travelling position and in the firing position. The condition of the tires is checked, and how well they are held by the side rings, as well as the tightness of all nuts and hub caps on the wheel. The hub cups should be removed, the status of the grease checked, and, when necessary, it should be replaced.

Then, the securing of the upper and lower movable plates and of the lower folding plate should be checked. After this, the sighting mechanisms are inspected, after first making certain that there are no dents or cracks on the external parts, no traces of rust, that the vials of the levels are not broken nor the optical parts damaged, and that the sighting mechanisms operate correctly.

When checking the zero positions of the mechanical sight, the barrel is moved to the horizontal position according to the test level which is installed on the test area of the breech. Then, the test level is placed on the face of the basket of the panoramic sight (In parallel with the lateral level), and adjustment of the position is made until the bubble is in the middle. The bubble in the longitudinal level is moved to the middle of the pilot wheel mechanism of the angles for the location of the target.

The reading 0-00 should be on the one-thousandth scale of the sighting angles mechanism and on the long-distance drum. The reading on the scales of the angles to the location of the target should be 30-00, and the bubble of the lateral sighting level should be located in the middle.

The check of the zero sighting line of the mechanical sight is carried out on a distant point or bore-sighting screen. Filaments are cemented, according to scale marks, on the muzzle face of the barrel. The barrel is guided onto the distant point, sighting through the opening for the firing pin and using the center of the cross filament on the muzzle face. After this is completed, turning the pilot wheel of the of the gunner's quadrant and of the cartridge ejector, the cross-filaments of the panoramic sight are superimposed over the point on which the

barrel has been guided. The reading on the scales of the gunner's quadrant of the panoramic sight should be 30-00, and on the scales of the cartridge ejector should be 0-00. If these positions do not come up on the sight, the approporiate screws should be loosened, and the zero values set, after which the screws should be tightened again.

An optical sighting is carried out at the same time as the mechanical sighting on a distant point or with a bore-sighting screen. After guiding the barrel of the weapon onto a distant point (The crosses of the bore-sighting screen) by using the pilot wheels of the sighting and leading mechanisms, the top of the sighting mark of the graticule gunsight is superimposed on the aiming point (The cross-filaments of the bore-sighting screen). In this process, the horizontal filament should be superimposed over the zero-scale points of the distance scale, and the vertical filament should be aligned with the zero scale points of the side correction scale. If these lines deviate from the zero scale points, their position is converted to the zero scale points by using alignment mechanisms.

STATISTICS AND FACTS

MARCH 8, THE INTERNATIONAL WOMANS' DAY

International Womens' Day which occurs on March 8 was established in 1910 at the second international Conference of Socialist Women as a day of solidarity of working women in the struggle for equal rights. The first such day was celebrated in 1911 in Germany, Austria, Switzerland, and Denmark under the slogan "Voting rights to women workers for unification of their forces in the battle for socialism".

Today, the womens' movement has turned into a mighty socialist force. The MDFZh [International Democratic Federation of Women], which observed its fortieth anniversary in 1985, is a genuine exponent of the interests of working women. It voiced its objective not only for the struggle for economic, political, and social rights of women, but also for the battle for a stable peace and genuine democracy. All of the following subsequent great international actions on behalf of women took place on the initiative of the MDFZh and under its active participation: the International Womens' Year (1975), the Decade of the Woman (1976-1985), the Worldwide Congress of Women (Berlin, 1975 and Prague, 1981), the Worldwide Conference of OON [Organization of United Nations] (Mexico, 1975 and Copenhagen, 1980).

The women of the USSR and other socialist countries make an invaluable contribution to the general democratic movement for peace. Unanimously upholding the constructive and flexible initiatives of the Communist Party of the Soviet Union and the Soviet Government and directed towards curbing the current and increasingly more dangerous spiralings of the nuclear arms race, they systematically and persistently fight them in all of the forums of the international community of women.

The USSR occupies first place in the world with respect to the level of activist effort of working women, who occupy the leading position in such areas of the national economy as trade, public health, education, culture, the buying credit system, and State insurance. In 1928, women made up only around one-fourth of the service and labor force, and today they make up 51%.

In the USSR, 60% of those with secondary and higher educators are women, and among scientists, 40% are women. The State guarantees every woman that she can receive professional training, and an appropriate job. The number of women deputies during the course of the present decade. Making up today one half of the deputies of the local organs of power, one third of the deputies of the Supreme Soviet of the USSR, and more than one third of the deputies of the Supreme Soviets of the Union

assessment of the general technical condition of the vehicle is made.

The results of the diagnostics test of the vehicle are used in the carrying out of the actual technical servicing of these vehicles, and they are used by the trainees in practical exercises in the vehicle park which are intermixed with the accomplishment of automatic technical servicing of the materiel.

At the close of the exercise, the technical knowledge of the trainees is tested. For this, formalized charts with questions and the equipment of the Class of Programmed Instruction "Ritm-2M" [Ritm = rhythm].

INSTRUMENTS USED TO EQUIP TRAINING POSITIONS

FOR CHECKING THE TECHNICAL CONDITION OF THE ENGINE MECHANISMS AND SYSTEMS there are the following: the TU11Be0-003 Autostethoscope used to listen to knocks in en engine; the K-181 and KI-861 Compression Gauge; the K-69M Instrument for determining the technical condition of the cylinder-piston group, the gas-distribution valves, and the cylinder head gaskets; the KI-4887-1 gas flowmeter; the IMD-2M Instrument for determining engine power; the KI-8920 Device for checking the tension of the belt that drives the fan, the generator, and the compressor; the NIIA T-577B Instrument for checking the fuel pump and carburetors; the KI-9211M and NTs-108 testing units for checking and regulating the fuel apparatus; the KI-562 and KI-3333 Instruments for conducting a test of and regulating the fuel injectors; the KI-4941 ignition tester; the OR-9928 warning system of an obstruction in the air cleaner; the KI-4870 Device for checking the hermetic seal of the air intake channel; the PPF, KI-9917 Instrument; and the KI-4801 Device for checking the pressure in the low pressure fuel-supply system.

FOR CHECKING THE ELECTRICAL EQUIPMENT the following instruments are used: the KI-1093 and E214 Instruments for determining the technical condition of the basic elements of electrical equipment without removing them from the machine; the SP3-8M and KI-968 Testing Units for determining the technical condition of electrical equipment which has been removed from the machine; the E401 Set for determining the technical condition of the storage batteries; the E204 Instrument for determining the technical condition of the testing and measuring instruments.

FOR CHECKING THE CONTROL INSTRUMENTS, AND THE POWER TRANSMISSION COMPONENTS AND UNITS the following instruments are used: the KI-4382 Clearance Gauge for determining the total surrounding space in the power transmission units; the K-402 Instrument for determining the amount of free play in the steering wheel and the effort expended in turning the vehicle; Ruler Model 2182 for determining the alignment of wheels; the 2183 Instrument for determining the angle of wheel camber; the 1155M decelerator for determining the deceleration, and the KI-4998 Testing Unit for diagnosing brake operation.

FOR CHECKING THE UNITS OF THE HYDRAULIC SYSTEM there are the following: the KI-4815 Test Unit, and the KI-1097 and KI-5473 Instruments for determining the technical condition of hydraulic systems without removing the units from the machines.

MAINTENANCE OF THE SVG-200V DIVING STATION

Captain of the First Rank K. Alisov

Before beginning diving operations and in accord with the Operational Instructions, one must make certain that the ULGS-1 Unit which prepares the gas breathing mixture and the PPG-1 Gas Supply Panel are in normal technical condition.

Based on calculations of the anticipated depth of submersion and the period of work of divers, cylinders with helium and oxygen are connected to the Unit (The estimated number of these is calculated earlier), as well as a piping system for the supply of an emergency breathing mixture and air in high and medium pressure (Before, descent of the diver, the condition of the emergency mixture and the pressure it is under must be checked). If there is no possibility of using the UPGS-1 Unit, cylinders with the breathing gas mix may be connected to the PPG-1 Gas Supply Panel.

During the course of the basic preparations for use of the SVG-200V Diving Equipment, an external inspection of its components should be made, and the breathing apparatus should be charged with the gas mixture and the chemically regenerating substance. Then the equipment units should be mounted so that the half-coupling junction units may be installed on the supply cables, the diving hoses should be connected to the ship diving drum, and they should be tested under operational pressure. The telephone-microphone headset is to be installed in the hydraulic coveralls, and the diving cables are to be bound with the supply cable into a single binding.

After finishing the charging of the cylinders of the breathing apparatus (As indicated by the manometer of the compressor), assurance should be made that they are filled up to the Standard (For this, 8-10 minutes after charging, the valves on the cylinders of the Unit should be opened for a brief time). Then, the regenerative cartridge of the breathing apparatus should be blown out with dry air. This should be done in order to remove any dust-forming chemical substance which may fall into the breathing system of a diver. The installation of the valve plug should be tested in the breathing apparatus which has been readied for operation.

When checking the breathing apparatus, experience has shown that particular attention should be paid to the hermetic tightness of the valve of the change-over switch for the operational regimes of the apparatus, to the amount of pressure in the gas mixture in the cylinders, to the good repair of the

leaf-type valves, to the hermetic tightness of the emergency-supply valve, and to the timeliness of the replacement of the warning device at the end of its operational life. In addition to that, the sound operation of the automatic lung machine, the valve of the change-over switch, and the amount of uninterrupted flow of gas through the emergency and operational nozzles should be checked. The storage time of the power supply unit for the warning unit should not exceed 12 months after the day it came off the production line.

The hermetic tightness of the valve of the change-over switch is checked when it is passing out through the valve cage. The adapter of the breathing bag should be sealed. If the exhaled gas does not pass into the breathing bag, the valve is hermetically sealed.

The amount of uninterrupted flow of gas (Through the emergency nozzle) tested with the PKU-1 [Checking and Testing Unit] should amount to between 4-6 liters per minute, and through the operating nozzle, from 9.5 to 10.5 liters per minute (In the latter case one must be certain that the pressure of the gas mixture in the hose does not exceed 11 kilogausses per square centimeter.

The hermetic seal of the apparatus must be checked in the water. Initially, the low-pressure chamber is tested. For this, the diver must make several exits at the times when the supply of the gas mixture is closed off. The breathing bag of the apparatus is filled with air passing along the diving hose (The hose of the valve cage is switched to the position "For air"). The hermetic tightness of the high pressure chamber of the apparatus is checked, removing the screw cap from the protective valve of the breathing bag, and installing a cover on it. The loss of bubbles of gas from the joints and unions on the apparatus are evidence of its not being air tight.

When checking the hydraulic coveralls, one should make certain that there is no evidence of chafing, and that the reinforcing and imbedded bands in the suit do not become unglued, and that the protective valves are in good working order. In this process, one should seal every opening in the hydraulic coveralls, and develop a pressure of 0.004 megapascales (400 mm water column). After this, a soapy solution should be sponged onto the surface of the coveralls, and a very careful check should be made to affirm that no gas bubbles are escaping.

For the emergency nozzle, a reduction in the supply of gas through the automatic feeding machine may sometimes take place when it is obstructed or when the pressure at the outlet of the reducer of the breathing apparatus is lowered. In the latter case, the nozzle should be washed in alcohol and blown out, and if it is not possible to overcome the malfunction in this manner, it should be replaced.

Occasionally, a lack of hermetic seal in the automatic lung, in the valve of the emergency gas supply, or in the reverse valve may develop as a result of an obstruction or damage to the pad of the associated valve. One should inspect the valve, and, if necessary, replace it.

A lack of hermetic tightness in the change-over valve may be occasioned by an increase in friction in the rubber ring when the grease dries out. This is eliminated by applying VNIINP-282 grease to the rubber ring.

In the high and low pressure chambers, a lack of hermetic seal may arise as a result of only a weak compression on gaskets, or a weakening of pressure as a result of shrinkage of rubber packing, as well as a lack of hermetic seal in the bellows of the automatic gas-feeding mechanism. Threaded connections should be tightened, and, when necessary, the packing and bellows should be replaced.

The malfunction of the warning device may be caused by the ChRTs-63 feeder element going out of commission or by a break in the core inside of the cable.

The admission of water inside of the hydro-coveralls may be connected with a breakdown of the quality of the cloth and of the seams in the garment (With poor weaving of its appendix) or even loss of the hermetic seal of the etching or safety valves of the hydro-coveralls or of the connections between the sleeves and valve cage.

At the location of a damaged place, patches of rubberized cloth are cemented on from both sides. The appendix is rewoven. The valves are washed with fresh water, and, when necessary, the etching valve or the leaf-type valve built into it may be replaced, as well as the pad and spring of the safety valve. The condition of the gasket on the valve cage is checked, and, when necessary, it is replaced.

The time-frames and amounts of the planning and preventive inspections and repairs of the SVG-200V Diving Station are the same as in corresponding models of other diving stations.

FOR YOUR NOTEBOOK

EPOXY GLUE

This glue is prepared by mixing epoxy resin (ED) with a plasticizer, dibutyl phthlate (DBF)* -- usually 10 to 15% -- and with a hardener. When the epoxy composition is being manufactured, powder fillers are added to the mix. Hardening takes place as a result of polycondensation or the "cross-linking" of molecules of resin with the hardener at normal or elevated temperatures.

Usually, in cold-hardening glues polyethylene polyamines (Pepa) and hexamethylenes are used, introduced as 10-12 parts of gravimetric weight into 100 parts of epoxy resin. The resin is heaated in a water bath or in a thermostat to 50-60 degrees centigrade, after which the polyethylene polyamines are added and thoroughly mixed. If the resultant glue is too viscous, acetone or ethylcellosolve (ETsZ) are added.

The freshly manufactured glue is immediately used for the purpose for which it was designated, because the time-frame of its useful life usually does not exceed 20-30 minutes at 20 degrees centigrade. The glue is applied to a cleaned and grease free surface, and the joined parts are pressed together under a pressure of 0.2-2.0 kilogausses per square centimeter. Under normal conditions, the glued joint hardenes in 24 hours.

When manufacturing hot-hardening type glue, maleic anhydride (MA), triethanolamine (TEA), and dicyanodiamide (DTsD) comprise the hardener.

During the manufacturing of Glue, the epoxy resin is heated to 60-70 degrees centigrade, and the hardener (MA, TEA, and DTsD) is suspended in a thermostat, after which both liquids are thoroughly mixed.

When manufacturing paste and compounds (Both for cold as well as hot hardeners), initially a well dried (At a temperature not less than 110 degrees centigrade) filler is introduced, the compound is carefully mixed, and only after that the hardener is added to it.

*
The conditional abbreviations were used only for this data.

The working temperature of the glued joints of epoxy resin is from 60 to 100 degrees centigrade for cold hardening, and 120 degrees centigrade for hot hardening. Breakdown of the material in the glued joint begins at 320-340 degrees centigrade. The glued joint is resistant to water, oil products, weak acids, cracking, and molds.

When the glue hardens, it diminishes in volume, i.e., a shrinkage takes place which can lead to cracking and a breakdown of the layer of glue. In order to reduce the shrinkage, an additive is put into the glue composite, a dust-fine quartz sand (PKP), or, if there is none available, a substitute like porcelean dust, portaland cement, etc.

One may add metallic powders as a filler to glue which is to be used for repairs in parts such as cracks and dents.

EPOXY GLUE

Brand of glue content in parts by weight	Intended use	Waiting time for hardening
D-2, ED-6 - 100; MA - 2.3; PKP - 1.5- 1.8	For gluing ferrous and non-ferrous metals, ceramics, and glass	10 hours at 120 degrees centigrade
D-6, ED-6 - 100; DBF - 10 - 15; GMD - 8 - 10	For gluing ferrous and non-ferrous metals, ferrites, ceramics, glass, leather, wood, laminates (Getinaks, textolite, fiber-glasses on a base of polyester and epoxy resins), etc.	24 hours at 25 plus or minus 10 degrees centi-grade or 5 - 7 hours at 70 plus or minus 5 degrees centigrade
D-8, ED-6 - 100; DBF - 10 - 15; PEPA - 10 - 12; PKP - 1 - 1.6 grams *	For repairing pitting ferrous and non-ferrous castings	The same

*
g = The total amount of resin and hardener.

Brand of glue content in parts by weight	Intended Use	Waiting time for hardening
D-9, ED-6 - 100; DBF - 10 - 15; PEPA - 8 - 10	For gluing ferrous and non-ferrous metals, ferrites, ceramics, glass, leather, wood, laminates (Getinaks, textolite, etc.)	24 hours at 25 plus or minus 10 degrees centigrade
D-16, ED-6 - 100; PKP - 1.5 grams; TEA - 10	For gluing ferrous and non-ferrous metals, ceramics, and glass	10 hours at 120 degrees centigrade or 7 hours at 140 degrees centigrade
D-54, ED-6 - 100; DTsD - 0.5 k** ETsZ - 7 - 8.5 k**	For gluing ferrous and non-ferrous metals, ceramics, glass (When necessary to develop a fine glued joint 5 micromicrons and above), and electric rotor and stator iron	3-5 hours at 185 plus or minus 5 degrees centigrade

**
k is the epoxy number associated with the given batch of resin

EPOXY GLUE

Brand of glue content in parts	Intended use	Waiting time for hardening
D-86, ED-6 - 100; TEA - 10; DBF - 10; acetone - 40 - 80	For gluing ceramics, glass, magneto-dielectric plates, ferrous and non-ferrous metals in those cases when it is necessary to provide electrical contact between glued surfaces	10 hours at 120 degrees centi-grade or 7 hours at 140 degrees or 5 hours at 160 degrees centi-grade
	For gluing highly polished (From the 7th class and higher) and precise surfaces, for hermetically sealing soldered and welded joints, for those cases when flowing of the glue onto the surfaces adjoining the glued joint is not permissible	1 - 1.5 hours at 25 plus or minus 10 degrees centi-grade and thermal processing for 5 hours at 70 degrees centi-grade or 2 hours at 100 degrees centigrade or 3-4 hours at 140 degrees centi-grade

GLUING TECHNOLOGY

The quality of the glued joint depends to a large extent on the preparation of the surfaces being joined. They must be matched to each other in a way that provides a maximum amount of surface contact between them, there must be created an optimum amount of roughness of the surface part, and they must be cleaned of dirt and oil.

After the glue composition has been applied, the glued surfaces are clamped together. This improves the strength of the glue bond, since the surpluses of glue and the air bubbles are pressed out, and the layer of glue becomes uniform and thinner. The final operation in the gluing is waiting (For hardening) with or without heating of the glued area.

Holes and cracks in the parts are repaired with glue with an application of fiberglass patches or metal plates. Parts with thick walls (For example, reduction gears or engine blocks) having cracks are repaired by drilling into the ends of the cracks, then the edge is champferred at an angle of 60 degrees

and to a depth of not more than one half of the thickness of the walls. Before applying the glue, the surface around the crack is cleaned and any oil on the surface is removed.

Epoxy resin, the hardener, and plasticizers are toxic substances, and, therefore, before working with them you should take the following appropriate protective measures: put on special coveralls, rubber gloves, and protective glggles; heat the glue and its components only under an exhaust hood equipped with an exhaust fan. The hands should definitely be coated with a soap emulsion if one is working without gloves, creating a protective layer on the skin.

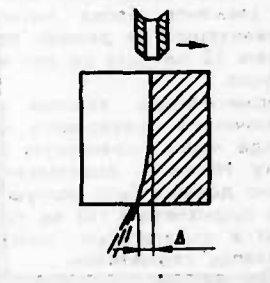
TiV [TEKHNIKA I VOORUZHENIYE] CONSULTATION

Colonel V. Grinin, Lieutenant Colonel S. Bedirdinov, and Captain S. Fedorov

TIPS FOR THE REPAIRMAN

CUTTING METALS WITH A TORCH

Low-carbon steels with a content of carbon up to 0.4% lend themselves well to oxy-acetylene cutting. Medium-carbon steels are cut with prior heating along the cutting line to a temperature of 250-300 degrees, and with a subsequent slow cooling. Oxyacetylene torches will not cut cast iron. Neither do non-ferrous metals lend themselves to oxyacetelylene cutting because they have a low melting temperature, high heat conductivity, and they form infusible oxides.



The cutting regime is established according to the following specifications: the pressure of the oxygen, the dimension (Number) of the cutting and heating torch jet orifice, and the rate of advance of the torch.

When the thickness of the metal being cut is known, the values of these specifications are determined according Table 1 for oxyacetylene cutting, and according to Table 2 for kerosene-oxygen cutting. With the use of kerosene (Or gasoline), the pre-heating time up to the beginning of the cutting is increased, and the rate of cutting is reduced, although the quality of the edge of the cut is better.

The cutting rate is determined, as a rule, by the trial and error method. If the disfiguration of the line along the border does not exceed 10-15% of the thickness of the metal, the rate that was chosen is correct (Look at Drawing). An accepted method of testing for this is according to the nature of the ejection of the sinter from the cutting slit. The advance rate of the torch is considered normal if the spray of sparks exits from the cutting slit almost parallel with the oxyacetylene flame. If the rate of cutting is low, the spray of sparks then flows out in the direction of the movement of the torch. If it is high, the spray is emitted in the opposite direction.

For the cutting edge to be clean, the distance between the jet orifice and the metal surface must be kept constant. The selection of the correct distance depends on the thickness of the

metal. So, for thicknesses of 3-10; 10-25; 25-50; 50-100; 100-200; 200-300 mm, the distance should be (2-3; 3-4; 3-5; 4-6; 5-8; 7-10 mm respectively.

Parameters (For UR type torches)	Thickness of the metal being cut, in mm					
	3-6	6-25	50	100	200	300
Number of the exterior torch jet orifice	1	1	1	2	2	2
Number of the internal torch jet orifice	1	2	3	4	5	5
Pressure of the oxygen in the operating chamber of the reducer in Kilogausses per sq. centimeter	3.5	4	6	8	11	14
Pressure of the acetylne in kilogausses per sq. centimeter	From 0.001 to 0.1					

Parameters (For the RK-62 torch)	Thickness of the metal being cut in mm			
	Up to 20	20-50	50-100	100-300
Number of the interior torch jet orifice	1	2	3	4
Pressure of the oxygen in the operating chamber in kilogausses per sq. centimeter	4-5	5-7	7-9	9-12
	From 1.5 tp 3			

If the distance between the orifice and the metal is less than the prescribed values, the orifice may be obstructed by the spray of metal. If it is greater, the width of the cutting slit is increased, and the quality of the edge is reduced. When working with gases substituted for acetylene, the prescribed distances increase by 30-40%.

After installing the appropriate jet orifice and the required pressure in the oxygen and acetylene (Kerosene), a check should be made to see that the connections in the torch and in the hoses are tight. After cutting down on the withdrawal of oxygen and fuel through the torch, the indicators of the manometers should stop. The hermetic tightness of the connections may be checked also by using soapy water.

TIPS FOR THE REPAIRMAN

MAKING REPAIRS WITH EPOXY PASTES

In order to give the paste the required strength, to increase the reliability of the mutual bond between the paste and the metal, and to approximate the coefficients of their lineal expansion, appropriate additives are put into the the compound of the paste such as finely ground Portland cement powders, silica flour, carbon black, mica, graphites, bronze, aluminum, iron, and steel. Fiberglass fabric, fiberglass molding material, and asbestos meal are also used.

Powdered steel or Portland cement is used in the repair of parts made of steel and iron. Fine aluminum powder or silica flour are mixed in in the repair of parts made of aluminum alloy. The best results in terms of shock strength are achieved by using fiberglass molding material or fiberglass fabric as a filler. For increasing heat resistance, a paste of asbestos meal is used (170 - 180 degrees centigrade).

Following is the procedure for the manufacture of epoxy paste. Epoxy resin is heated to 60 degrees centigrade, a plasticizer is added, and carefully mixed in. Then, a filler is put in and the mixture is mixed a second time. Forty to fifty minutes before the application of the paste is to begin, the hardener is mixed in. If needed, a slower setting paste is used (For example, 20-24 hours). This is kept at a temperature of between plus one to plus four degrees centigrade, and, immediately before the paste is used, it is heated up to 15-18 degrees centigrade. At room temperature, the time required for complete hardening of the paste is 15-18 hours.

The ends of cracks less than 100 mm long are drilled (With an opening of two-three mm), the edges of the crack are widened at an angle of 45 degrees, and then cleaned. Such a preparation results in the best cohesion of the epoxy paste with the metal. After this, the edges of the joint are cleaned of grease with acetone, and then filled with epoxy compound. The paste hardens best if the part to be repaired is first heated to 60-80 degrees centigrade.

If the length of the crack is more than 100 mm, after putting the epoxy paste into the joint, a patch of fiberglass fabric is placed on top (In two-three layers), and each layer is rolled down with a roller. Before applying the first layer to the area of the crack, it is cleaned until the metal shines, any grease is removed with acetone, and the area is covered with a thin layer of paste. A thin layer of epoxy composition is also applied to the first patch layer.

Flaws not deeper than one mm are filled in as follows. The surface of the part is cleaned, grease is removed from it with acetone, and, after waiting 10-15 minutes, the flaw is filled with epoxy compound using a glass spatula. Then, the part is allowed to set for 20-24 hours at room temperature.

With crack depths greater than one mm, a patch of fiberglass molding material is placed on the surface of the epoxy mix. The patch should extend beyond the defective area by two-three mm.

No. of epoxy paste	Chemical content of paste in parts by weight									Use
			Hardeners		Fillers					
	Epoxy resin ED-6 (ED-40)	Plasticizer (Dibutyl phthalate	Polyethylene Polyamine	Maleic anhydrid	Powdered steel	Portland cement	Silica meal	Aluminum powder	Fiberglass fabric	For repair of pipelines, tanks, filling cracks on iron
1	100	15-20	7-9	-	-	-	30	-	-	For repair of pipelines, tanks, filling cracks in iron and steel
2	100	15-20	7-9	-	100-130	-	-	-	-	
3	100	15-20	7-9	-	-	100-130	-	5-10	-	For filling cracks in aluminum alloy
4*	100	15-20	7-9	-	-	-	-	-	-	For protection from corrosion
5	100	5-10	7-9	-	-	-	-	-	-	For gluing
6	100	20	-	30	-	-	100-200	-	-	For repair of critical materials operating at temperatures of 120-180 degrees centigrade

*
R-40 Thinner or 646 Solvent in 50 parts by weight are included in the paste.

THE TRAINING OF MILITARY ELECTRICIANS

Colonel L. Starostin, Honored Power Engineer of the RSFSR [Russian Soviet Federal Socialist Republic)

The unfailing operation of electrical stations and the uninterrupted provision of electricity to military consumers to some extent depends on the qualifications of the electrician. Additionally, work with electrical generating sets requires particularly careful observance of the safety requirements for the equipment. Therefore, increased requirements are imposed for the training of electricians. Before being cleared for work on electrical generating sets, each specialist should pass a theoretical course, assimilate definite skills, and take an examination.

The initial training for an electrician is carried out in the training units, and in monthly assemblies in the military operational units. Section commanders who are the heads of electric stations are trained in the training units. Electricians and driver-electricians who maintain low-power electric stations and power supply units (Up to 30 kilovolts) are trained in the monthly assemblies.

As a rule, the assemblies are conducted in the beginning of the winter and summer periods of training at the district or group of forces levels. The objective of the assemblies is to teach the electricians (Driver-electricians) to technically operate the combined arms movable electric stations with competence, and to eliminate the most simple types of trouble, strictly observing the rules of safety with electrical equipment.

The program is designed for exercises with electricians (Driver-electricians) who have not undergone training in training units or training organizations of DOSAAF [All-Union Voluntary Association for Cooperation between the Army, Aviation, and Navy]. Electricians who operate gasoline and diesel electrical units are as a rule trained individually. If this is not possible, they may be trained together with appropriate selection of the program within the assigned time.

Specialists who are well acquainted with the equipment and have adequate operational experience with electrical installations are recruited for the conducting of the exercises. In the beginning of the training assembly, an initial briefing is given at the work site on the safety procedures, and they are assigned to a No. I Qualifications Group with respect to safety procedures with appropriate development of knowledge tests in the grade book.

At the exercises on the fundamentals of electrical engineering, the trainees are instructed about the physical principles underlying the operation of electric power generators and electric stations, and they are acquainted with the procedures for operating metering devices. The group and class exercises are planned so that they proceed in parallel with practical exercises, or that they preceed them. The exercises in technical maintenance, control, adjustment, and routine repairs are carried out right on the operating electrical generators and electrical stations in the system or in the training area.

In order to reinforce the training materials and the rules of safety with electricity which have been covered, self-training is organized, during which the future electricians take up the work of the electrical systems, parts, and components of the electrical generators in more detail under the supervision of the section commanders and with the aid of the recommended literature. This affords the possibility of mastering the subject being studied and of better preparing for the daily practical exercises.

In the process of the exercises on the rules for operating the electrical generators and for observing the safety procedures, the trainees are made acquainted with the use of protective resources, and with the procedure for administering initial aid to victims of an accident. They learn the fundamentals of electrical engineering, the operating principles and construction of the generators and electric stations, the rules for operating them (The work procedures, the amount of necessary technical maintenance and the time periods between servicing, the adjustment and tuning techniques, and the methods of warning about, identification and elimination of malfunctions in the system), and the rules concerning safety precautions.

The study is concluded with an examination in which the knowledge and paractical skills of the electrician are checked in accordance with the sample list of test questions applied to this program. In this process, it is necessary to evaluate the ability of each electrician to ready the electrical generators and electric stations for operation, to carry out the technical maintenance of them, to make the necessary adjustments, and to eliminate the malfunctions which occur, while observing appropriate safety measures.

When making a positive assessment of the knowledge and practical skills of the electricians, they are assigned to a No. II Qualifications Group for safety procedures, to issue certificates of proof of knowledge, and they are committed as on-the-job training personnel in the operation of the electrical generators and electric stations under the supervision of experienced specialists. They are assigned to operate electrical installations alone only after they have undergone the on-the-job training, and at that time they will be assigned to the No. III Qualifications Group on safety procedures. The assignment to on-

the-job training and independent operational service on electrical installations is made by order of the commander of the military unit.

With the objective of improving the qualifications of the commanders of electrical training platoons which are directly engaged in developing trainees, two-month assemblies on training methods are conducted. In these assemblies, the platoon commanders are engaged in methods training, studying the latest electrotechnical devices, testing units for training electrical repairmen, etc. Experienced teachers conduct the exercises. The knowledge gained in the assemblies aids the young commander in conducting exercises correctly with respect to methodology, and in the capable use visual aids, cut-away devices, models, and testing units.

Energonadzor [Energy Control] Groups should (And must) render a significant assistance in the organization of assemblies and in the training of electricians in the military districts and groups of forces. The Energonadzor inspectors conduct exercises in the study of the rules of power safety procedures, assist the commanders of units and formations to equip their operations with the necessary training equipment base, and to take part in the examinations and the commission which assigns the electricians to the qualifications group for safety procedures. The specialists of the Energonadzor groups continuously test the quality of the management of the assemblies and exercises in all of the military districts and groups of Soviet forces. Such assemblies in the Kiyev, Pre-Carpathian, Siberian, and Far Eastern Military Districts, and in the Group of Soviet Forces in Germany and in the Central Group of Forces are proceeding on a high methodological level.

The assemblies are planned in such a way that the electricians in each kind of army are trained separately. For example, the communication specialists prepare the driver electricians and the people who maintain the power supply units for the radio stations; the tank crew members train the electricians for the maintenance of supply and electric light stations; and the engineer units train the electricians for the electric power stations. Such a principle for the organization of the assemblies permits a more purposeful way to study the program specifically with respect to those installations which are to be operated in the military units. In this matter, particular attention is directed to the practical maintenance skills.

In our view, experience in conducting competitions for the title of the best electrician of the movable electric station in the military units of the Odessa, the Siberian, and the Central Asian military districts deserves attention. Such competition facilitates a wide enlargement of progressive experience and maintenance of electric generators within the forces, and, at the same time, it permits identifying the weak aspects in the training of electricians on which attention will be directed in

the course of the daily training operation.

Republics, they have a direct role in the development and adoption of important decisions on internal and external policy matters in our State.

IN THE MILITARY REGIONS, GROUPS OF FORCES, AND IN THE NAVY

THE ORDER OF LENIN LENINGRAD MILITARY DISTRICT

The Guards Tank Division, which was Twice awarded the Order, met the 27th Congress of the Communist Party of the Soviet Union with new successes in military and political education. The Company is the initiator of socialist competition in the ground forces. On the day the Congress will be opened, each one-third of the military personnel of the Unit will have had excellent results in training and in the mastering of new combat techniques.

The Deputy Commander of the Division for Weapons, Guards Lieutenant Colonel V. Mushko is discussing an exercise plan with the Deputy Commander of the Units for Technical Matters, Guards Senior Lieutenant V. Loyem and Guards Captain V. Liski.

This is the Commander of an excellent Armored Tank Repair Platoon, Guards Senior Warrant Officer V. Maksimov.

During tactical training, Battalion Commander Guards Captain Yu. Veretennik (Left) is assigning a task to his Deputy for Technical Matters Guards Senior Lieutenant Ye. Volkov.

Photo by A. Maksimov.

A TECHNICAL DIAGNOSTICS CLASS

Colonel Ye. Aleshechkin, Master of Engineering; Major V. Mishchuk

In the Kaliningrad Higher Engineering Institution for Engineer Troops imeni A. A. Zhdanov, a special classroom facility is equipped. In this class facility practical exercises are conducted in diagnosing problems in materiel.

Various types of engines are situated in special exhibits: ZIL [Moscow Motor Vehicle Plant imeni I. A. Likhachev], GAZ [Gor'kiy Motor Vehicle Plant], YaMZ [Yaroslav Order of Lenin Engine Plant], V-2 [Expansion unknown], etc. They are equipped with a system for exhausting expended gases outside of the auditorium. Elements of electrical, hydraulic, and pneumatic drives, and components of transmissions and power drives of engineer weaponry vehicles are grouped according to type.

Wheel vehicles may be parked on areas prepared for that purpose. Tracked materiel is positioned outdoors directly in front of the class. For this, vehicles belonging to the unit and which have been allocated for use in training are used. The maintenance schedule for the materiel is correlated with the training plans.

Each training position is equipped with the necessary assembly of tools and instruments, with sets of technical documentation, and with graphic teaching aids. Many of these have been manufactured by innovators among the instructors, for example, the attachments for the following tools: KI-5472, KI-13902, KI-4801, and others, which adapted this equipment for use in diagnostics on tracked vehicles. The KI-4813 and E214 tools have been significantly modified, and they may be used to test components and systems of special machines.

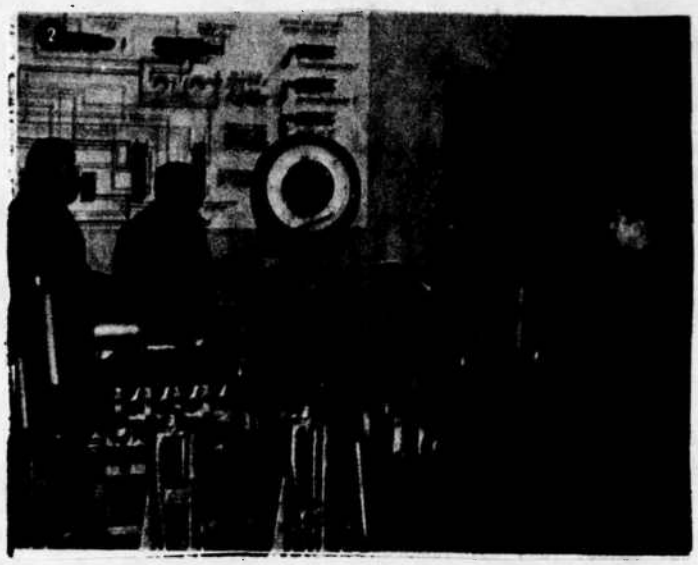
Descriptions of tools and testing units and structural diagrams of the operations are shown on panels hung on classroom walls. For each training position, there have been developed instructional charts with lists of tools, devices, instruments, inventories, the technical conditions and sequence of the operations in the work, testing charts, and a table of ratings and permissible performance parameters. The chart is printed on heavy paper and fitted in a case of clear plastic.

During the exercise (As a rule, it lasts for 6 hours) training problems are worked out in teams of 2-3 people.

For example, in a training position with the KI-8930 testing unit, where wheel vehicles are delivered for diagnostics testing, a general diagnostics testing of the vehicle is conducted , and the following basic performance parameters are determined: the power to the drive wheels, loss of power in the elements of the transmission, the hourly use of fuel, rate of crankshaft rotation, speed of the vehicle, and the condition of the clutches. A test-diagnostics card is filled out, and an

In The Red-Banner Far-East Military District. The Motor Vehicle Materiel Faculty of the Ussurian Higher Military Motor Vehicle Command School which is headed up by Professor Graduate Engineer Colonel V. Vasil'chenko, Cavalier of the Order of the Red Banner, is one of the best in the school.

(1) Senior Instructor, Colonel B. Dolmatov and Instructor Major Yu. Nefedov discuss the new methodological development.



(2) Major V. Basov, one of the best methodology specialists in the Faculty, is conducting a laboratory exercise with trainees.

(3) Senior Instructor, Lieutenant Colonel V. Burdinskiy, consults trainees S. Ivanchikov and S. Voloshin (From the right).

(4) Senior Instructor, Lieutenant Colonel V. Yeliseyev makes extensive use of audio visual materials in the design of which he took a direct role. He is the author of twenty innovative suggestions directed towards the intensification of the training process.

Photos by A. Romanov

THE ARCHITECTURE OF MICROPROCESSOR SYSTEMS: AN AID TO THOSE STUDYING THE COMPUTER

Colonel Ye. Antonov

Integrated circuits which have a circuit technology aimed at achievement of the function of the MP [Microprocessor], make up the base of the basic MKP IS [Microprocessor set of integrated circuits]. The basic MKP IS may include a single BIS [Large integrated circuit], and in this case one speaks of a single-crystal BIS. All of the functional (Computational and control) possibilities of the single-crystal MP are limited in terms of sections distributed in one crystal of the BIS, and the technology of manufacturing a multi-functional BIS imposes definite limitations. Single-crystal MPs most often have a simplified architecture, a fixed choice of commands, and a limited interface with memory and peripheral devices. Such MPs are completely appropriate for all kinds of metering, testing, or controlling functions, and for most of the specialized data processing operations. However, they often turn out to be unsatisfactory for solving problems in the processing of general types of data.

There are also double-crystal and multi-crystal MPs. As a rule, the latter are more technologically effective, have a more comprehensive set of commands and a high productivity, and, most importantly, they provide significantly greater functional possibilities in comparison with single-crystal MPs.

At the present time, multi-crystal MPs are built on the base of a set of specialized crystals of a BIS. There are in the set, as a rule, two or three bit disk sections designated for the processing of data, and one or several BIS in the control panel. From such bit disk sections, one may develop a microprocessor with a long word with from four to 32 bits.

Large integrated circuits are being developed in conjunction with microprocessor systems with the objective of further widening the functional possibilities of microprocessor systems for performing functions of memory, input and output of information, and interface with memory, periferal devices, etc.

The following characteristics are fundamental in the development of MPK IS: a modular construction of systems on the base of the MPK IS and a single-line arrangement of interfaces between the modules; a capacity that builds up in a random fashion; an expansible amount of RON [general-assignment registers]; the multifunctional aspect of the BIS and their specialization in a basic purpose (Processing, control, switching, interface, memory, etc.); functional completeness of

the MPK; the possibility of building devices on the MPK IS base with sequential and parallel information processing; microprogramming control with the implementation of any familiar command system under the user's conditions, random algorithms at the microprogram level; logic, electrical, and design compatibility with the BIS, and a single principle of organization of synchronization within the systems on the base of the MPK IS.

So, in this way, a broad assortment of devices allows the developer the necessary flexibility when designing various devices to achieve the assigned productivity and the benefit of the necessary set of commands. Thanks to the high speed and immunity, to the possibility of operating in a wide range of temperatures, and to the radiation resistance, the greatest preferance on the part of developers for metering, testing, and controlling systems is given to the bipolar MPK IS at the base of microprocessor sections which are designed on a technological circuit engineering base of TTLSh [Transistorized transistor logic with Schottky diodes].

The MPK TTLSh includes a wide gamut of processor interface and memory BIS for the building of devices which are varied in their use and productivity: two, three, and four general purpose address registers; arithmetic expanders; a BIS for organizing break devices, for controlling the memory of microprograms; electrically programmable memory devices with a capacity of one, four, and 16 K bits; associative memory devices; buffered registers; main line amplifiers and switching systems; and BIS for the organization of synchronic and asynchronic exchanges between an MP and peripheral devices. The last group includes BIS for the maintenance of displays, graph plotters, typing devices, photo-readers, teletypes, analog-digital and digital-analog transducers, and various controlling mechanisms. An important position among these is occupied by the so-called controllers which are devices consisting most frequently of one BIS and are used for control of the operation of peripheral equipment, including the logic processing of input information.

Our native industry produces a large number of MPK IS for the broadest possible range of applications. They possess high technical specifications and have a comparatively low cost. The choice of an MP which fulfills the needs of the designer is at times a rather difficult task, since it is necessary to take many factors into account which do not seem fundamental, but which, in the process of the work, take on an overriding significance. As a rule, the manufacturing plants provide most of the technical data on each MPK IS produced, however, the basic specifications which determine the advisability of choosing one or another MP, as experience has shown, are operational speed, the presence of means for checking out the system, the make-up of the set, support and maintenance of the microprocessor sets, and continuity with earlier produced sets. Among them, the operational speed of the MPK IS is one of the basic specifications which influence the choice of an MP. This is

measured in terms of the time for accomplishment of the set of chosen commands, i.e., the productivity, and not the rated value of the cadence rate. All of the multitude of varied applications where Mps are used based on the need for high-speed operation may be broken down into three basic groups: processing signals in real time; the solution of problems in the automation of various processes; and the building of the microcomputer and multiple-processing computational systems.

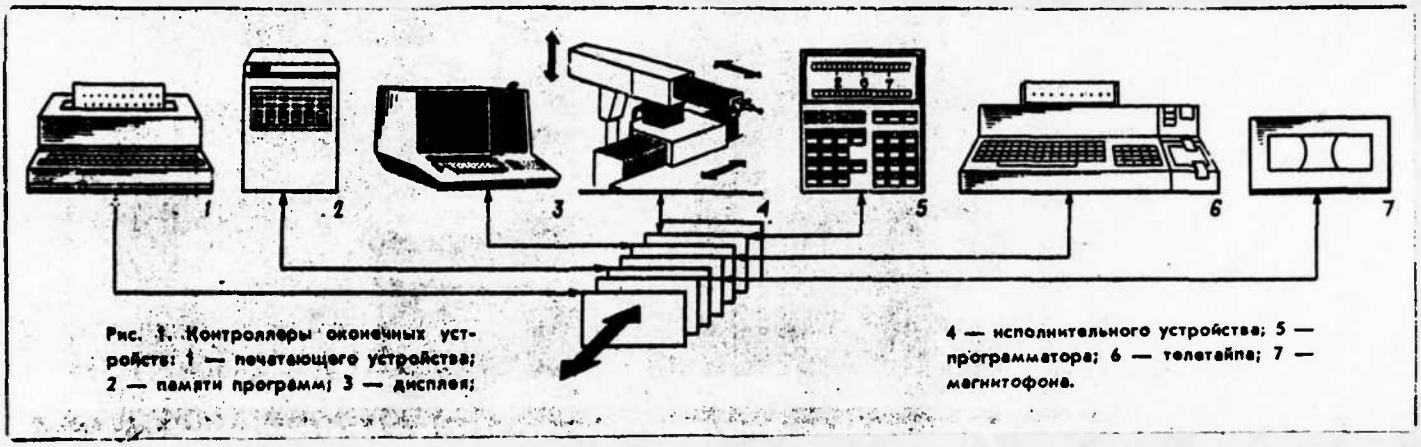


Рис. 1. Контроллеры оконечных устройств: 1 — печатающего устройства; 2 — памяти программ; 3 — дисплея; 4 — исполнительного устройства; 5 — программатора; 6 — телетайпа; 7 — магнитофона.

Drawing 1. A controller of output devices:
1 is a typing device; 2 is a development control memory; 3 is a display screen; 4 is a control device; 5 is a teletype machine; and 7 is a tape recorder.

The first group is characterized by maximum operational speed, i.e., it is equipped with the TTLSh technology and microprogramming, which allow the design of commands maximally oriented on one or another area of computer use. The successes of the technology permit the disposition of eight- and 16-bit disk MPs affording a speed of around 0.3 microseconds per operation.

For solving problems under the second group, the 8-bit disk MP of average operational speed is completely satisfactory with a completion time for one operation of around 0.5 to one microsecond. These MPs should have a branching system of commands with all types of addresses which permit making up effective operational programs designed for a small amount of memory.

The third group of applications may be accomplished more fully with a single-crystal MP with 16-bit buses of data, 20-bit address buses, and an operational rate of one to three microseconds for each operation. With operations accomplished in tenths of a microsecond by hardware, the adding on and dividing up of the micro-computer, designed on such a base, is in this respect approximating the advanced

mini-computer as far as performance parameters are concerned.

We understand system check-out resources to include the complex of hardware and program resources which are capable of carrying out the error-free integrating development of microprocessor systems within short time frames. The make-up of the complex takes on great significance during the development of series-produced microprocessor systems, and is designed to operate in conjunction with a large number of varied periferal devices. With respect to the broadening of the area of use of the MP, the make-up of the MPK IS is growing, and at present a number of versions already include several dozens of BIS [Large integrated circuits]. This permits the building of large microprocessor systems with a minimum number of auxiliary systems and attached elements. Moreover, the number of soldered joints, plug-in connections and sheafs of jumper wires is thereby reduced, and this leads to a substantial increase in reliability.

The accepted understanding of support and maintenance resources embraces the hardware and software resources produced by the manufacturing plant for the adjustment, system check-out, and manufacturing of microprocessor systems as well as the equipment for testing them. The maintenance process itself requires the development, introduction of changes, supplements, and improvements for which a need shows up during operation.

Continuity presupposes the use of earlier obtained experience (Hardware and software) in new developments.

All BIS in the make-up of MPK IS and the functions carried out by the microprocessor, memory, input and output devices, etc. are approved as independent units with a definite number of output accesses. We will examine the MP output system, having taken the universal 8-bit disk KR580IK80A Micropressor as an example. It has 40 output accesses. They are distributed in the following manner: three outputs are connected with buses for the current source, one is the housing for a microcircuit, two serve for connecting the output terminals of the cadence rate generator, eight are lines of the interior data bus, sixteen are connected with the lines of the address bus, and ten are output accesses connected with the MP control panel and serve as connections to the external control buses. The functional value of the latter outputs consists of clearing the receipt of information from the external bus; reflecting the indication of the transmission of information to the external bus; the transfer of a BIS to the initial condition; the clearing of the indication of readiness of a peripheral device for the exchange of information; the interrogation of peripheral devices about sending data and addresses to the buses; the interrogation of peripheral devices whether the microprocessor is serving them (Interrogation about the possibility of an interruption); clearing for the serving of

a peripheral device by the microprocessor; and synchronization.

Large integral circuits of OZU [working storage devices] and PZU [continuous storage devices] as well as the PPZU [Programmed continuous storage devices] and RPPZU [Reprogrammed programmed continuous storage devices] make up the base of the memory system of the MPK IS which is external in relation to the MP.

The OZU serves for storage of data appropriate for processing, the results of computations, and, in some microprocessor systems, also often changing programs. The OZU affords carrying out both recording and reading of words, and, moreover, the time necessary for access to one of the cells of the storage does not depend upon its address. When the current is switched off, the information which has been written in the OZU is erased.

The PZU is the device in which the basic operational program of the MP and several constants are stored. One can only retrieve from the PZU the words which are stored there, but one must not input new words and erase or replace words already recorded there.

The PPZU differs from the PZU in that the user independently inputs the contents by using a programming device, but he can do that only one time. A memory, the programming for which is carried out by the user by burning the nichrome connecting strips by a pulse of current one time during the operation of the system, serves as an example of such a PPZU.

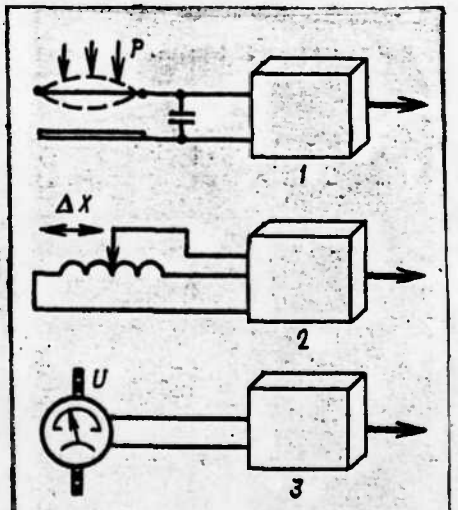


Рис. 2. Контроллеры датчиков первичной информации: 1 — давления; 2 — перемещения; 3 — напряжения.

Drawing 2. Controllers of transmitters of information: 1 is the pressure; 2 is movement; 3 is voltage.

The RPPZU, also called an erasable PZU, permits repeated erasing and rewriting of information using a programming device. Erasing of information is carried out by means of ultra violet radiation, and recording of information by means of electric signals in some such devices.

The address and control buses and the data bus are highly significant accessories of the MP and the microprocessor system. Information is transmitted only in one direction on the address bus: from the MP to the memory modules or to the information input-output device. If the bus is made up of 16 insulated lines, = 65 536 various combinations of binary bits or addresses may be transmitted on it. Each of these corresponds with a definite memory cell. The output to the address is provided by the appropriate code interpretor.

The data bus is a bi-directional bus. Data is transmitted on it either to the MP or out of the MP. The significant distinctive characteristic of the data bus is that simultaneous transmission of data in both directions on it is impossible. Such procedures are delivered on time by using time multiplexing.

The controlling bus is for the transmission of signals which provide interaction and synchronizing of the operation of all of the modules of the microprocessor system and internal sections of the MP. Moreover, one part of the lines of the controlling bus transmits signals being output from the MP, and the other being input to it. The merit of the bus structure of interaction between sections of the MP is the possibility of inputting new memory modules, peripheral devices, and other elements into the computer system.

A new Standard establishing the design and make up procedure of nomenclatures of integrated microsystems was introduced in 1981. In compliance with this Standard, new microprocessor complexes have a four-value number for the particular series (1800, 1801, etc.). Special codes defining the functional value of the microprocessor BIS are provided in the new Standard.

RECOMMENDED LITERATURE

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A. I. Berezenko, L. N. Koryagin, and A. R. Nazar'yan, Higher Speed Microprocessor Complexes, Moscow, Radio and Communications, 1981.

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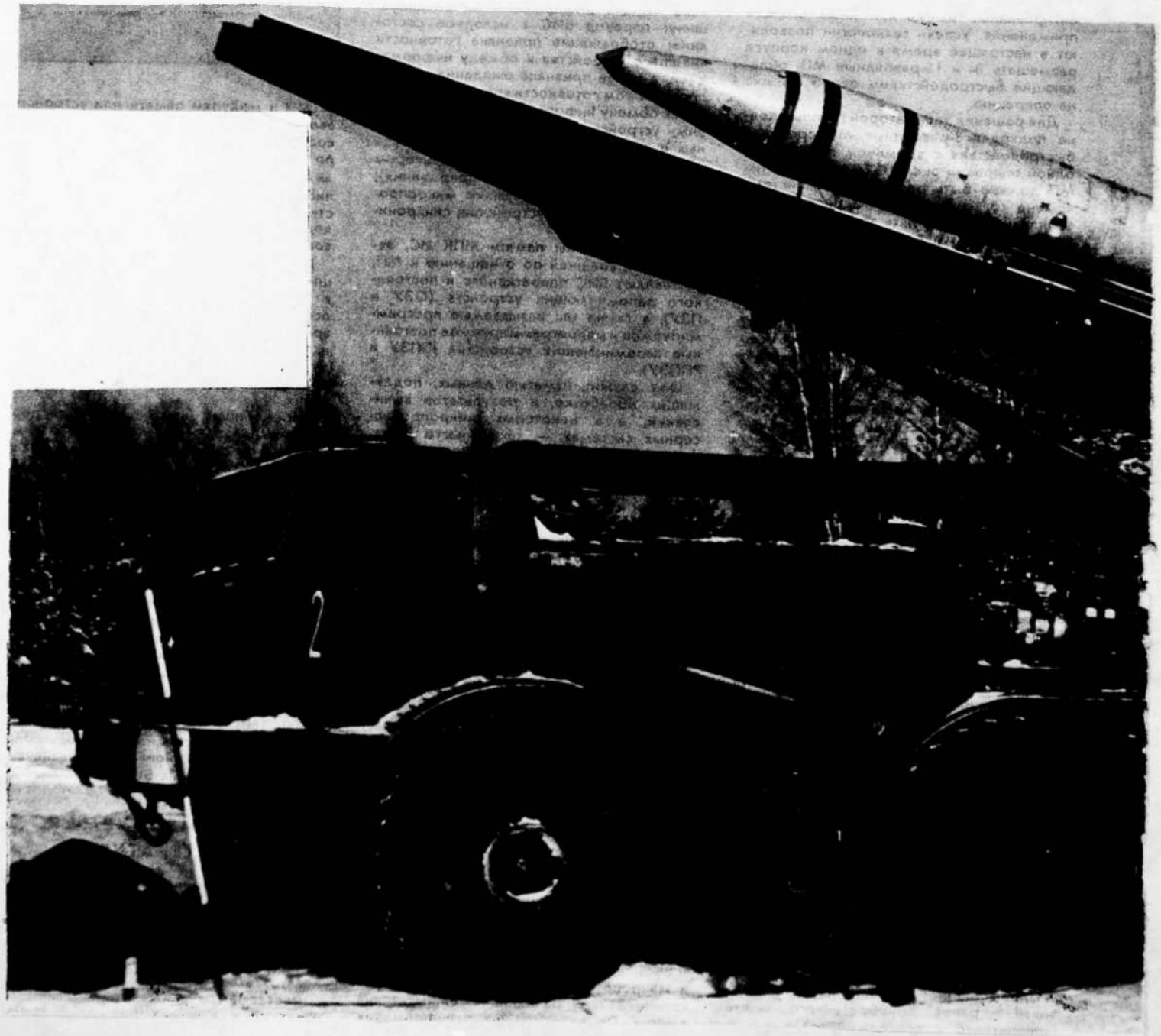
DIRECT YOUR ATTENTION TO FIELD TRAINING

In the year of the XXVII Congress of the Communist Party of the Soviet Union, the rocket troops of the battery commanded by First Class Specialist, Captain O. Alensyutin, strive to have the unit assigned the "excellent" title. The troops have opened up the competition for the achievement of high final results in the accomplishment of each training assignment and each quota. Particular attention is being directed to the improvement of field training.



Preparing a rocket for firing

A march in the area of the launching position.

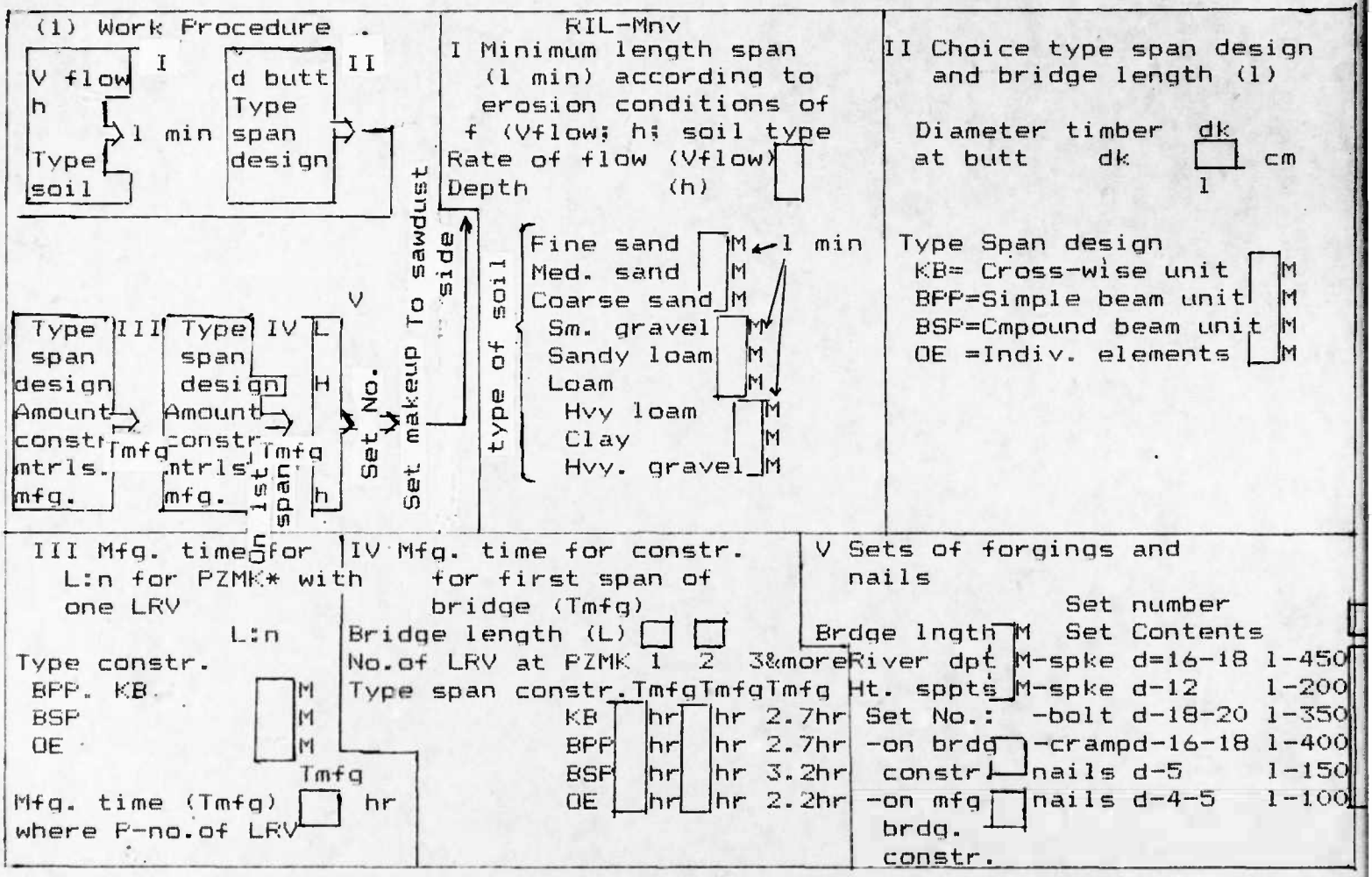
Photos by A. Stepanov and N. Vereshchak

THE ENGINEER'S SLIDE RULE

Lieutenant Colonel S. Vorushchak

In the Issue No. 9 of our Journal in 1984, under the rubric "The Rapidly Developing Tide of Innovators", information about the RIL-Mnv [Expansion unknown] (Low-Level Bridges) Slide Rule was featured. In response to readers' requests, Lieutenant Colonel S. Vorushchak relates in more detail about the rule's design and use.

In the data introduced on the slide rule, changes which have come about in recent years in the classification of calculated loadings, in the design of low-level bridges, in estimating methodology, in the means for mechanizing the construction of bridges, and in the preparation of designs. In Drawings 1 and 2 are shown the face and reverse sides of the rule (It may be made of plastic, plywood, or of thin sheet metal), and the slide is shown in Drawing 3.



*

PZMK = Manufacturing point for bridge construction materials

(2)
Work Procedure

VI
Brdge constr. resources
↓
Tcstr
VII
↓
Span length
Amount constr
to transport
↓
No. vehicles

RIL-Mna

VI Brdge Constr. Time
Type constr. materials:
-KMS "C" type ☐ Suppt
-USM ☐ Suppt
-KMS "O" type ☐ Suppt
-Maple ☐ Suppt
Tcstr
Constr.
time (Tcstr) ☐ hr

VII Reqt. for trnspt. vehicles
Ht. of span (1) ☐
Amt. constr. (1) ☐
Veh. required:
-4-5 T ☐ units
-7-8 T ☐ units
-12 T ☐ units

Correction coefficients at time of completion of task

1. Under night conditions -1.3
2. Working in gas mask -1.1
3. Working in OZK* -1.25
4. Mfg. MK* from:
   -frozen materials -1.25
   -hard materials -1.65
5. When erecting in winter with ice -0.9-1.0
6. Brdge constr with:
   -flow rates to 0.5 M/s-1.0
   0.5-10 M/s-1.2
   1.0-1.5 M/s-1.2-1.5
   1.5-2.0 M/s-1.5-2.0
   Water dpth from above 2.5-1.3-1.5
7. When erecting two-lane brdges -1.7-2.0

Piling design of supports

Piling design of supports

Longitudinal stability of
by use of KMS
1 < 50

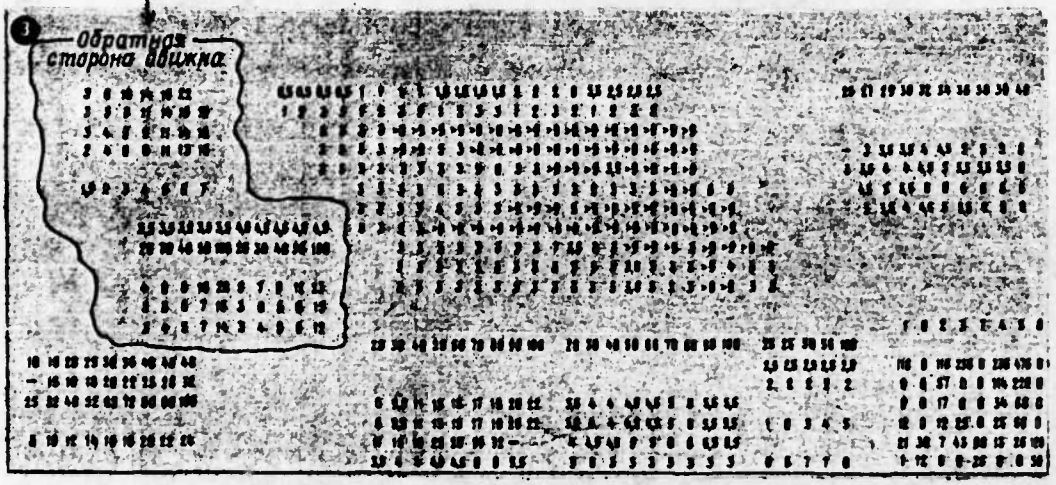
by use of USM
1 < 50

H-2
(Note with foundation)
1 > 50 1=3.5

1 < 50

* OZK = Winter clothing
MK = Construction materials

Reverse side of the slide



In the beginning, the necessary scale is laid off, and then openings are cut in the face and in the reverse side, and notations are made on it. The membranes rub against each other, and form a clean lining (Or slide). Therefore, the numbers on the slide write their own unique template.

For an illustration of the use of the rule, we will offer the following example.

Conditions. The commander of an engineer unit has been assigned the task of building a low-level bridge with a length of 140 meters with a load capacity of up to 55 tons. In the unit, there are designs for 40 meter bridges with a span of four meters. In order to accomplish the task, it is necessary to prepare a supplementary design of 100 meters of bridge. From data obtained in engineer reconnaissance, it is known that in the area where the bridge design is being prepared there are pine trees with an average diameter of 30 centimeters, the greatest depth of the navigable channel is three meters, and the bottom and bank are sandy loam.

Solution. First of all it is necessary to determine the minimum allowable span for the bridge according to the erosion conditions on the bottom. In order to accomplish this, on the Field I on the face of the rule, with the slide we establish the value of the flow rate (1.0 meters per second), and the largest depth of the water resistance (3 meters), and we determine the value of the minimum allowable bridge span (Three meters). In order to choose the type of design of the span construction, it is necessary to establish on Field II with the slide the diameter of the available timber material (30 centimeters), and to determine the maximum allowable size of the spans for various tupes of construction. In our case, the solution is BPP [Simple beam units] for a four meter span.

On the basis of the chosen type of design for the span construction, and, having the forces and means to accomplish the job, a decision is made for the organization of the manufacturing of the construction materials (To develop a point for manufacturing the bridge construction materials equipped with four LRV [Saw mills]).

Then, on Field III, opposite the chosen type of design of the span construction, we establish the amount of manufactured construction materials from a calculation for one saw mill (100:4= 25 meters), and we determine the time for manufacturing all of the construction materials (14 hours).

The time when the materials for the first span will be finished is a significant element, and, correspondingly, should be considered as it relates to the loading and hauling of the bridge materials to the construction area. This time is determined in Field IV or with consideration of the entire amount

of manufactured construction materials and the number of saw mills at the manufacturing point. For our example (Four LRV), the time for preparation of the construction materials for the first span of the bridge is 2.7 hours.

The following phase, that of determining the need for forgings and nails for the manufacturing of the bridge construction materials and for the construction of the bridge respectively. As a matter of convenience, forgings and nails are included in sets of materials for 25, 50, and 100 meter bridges or in the bridge construction materials for each. The make-up of the sets along with an estimate of the reserve at 20% of the volume is accomplished on the right part of Field V.

For the estimate of the necessary set of forgings and nails for the construction of a bridge, it is necessary to establish the values on the left part of Field V: the length of the bridge expressed in dimensions, the appropriate sets (140 100 50); the maximum depth of the river (3, that 2.5); The prevailing height of the supports (2 meters) and scan the number of the set and how many of them there are (No. 5 has one set, and No. 4 has one set). Then, according to the amount of construction materials to be manufactured (100 meters), the need for forgings and nails required to manufacture them is determined (No. 8 has one set).

The time for erecting the bridge is estimated after the decision has been made to organize its construction.

We propose that the construction of the bridge will be supported by two sectors, an initial bank sector 72 meters long with 19 supports, and one from the opposing bank 68 meters long with 17 supports. KMS [Sets of bridge construction resources] are used for the construction operation, extended in a C-shaped design. The construction time for the entire bridge corresponds with the time for erecting a single sector of great length. In order to determine the construction time of a sector resting on the bank, on field VI (The reverse side of the rule) opposite the type of bridge building means (The KMS C-shaped design) we establish the number of supports appropriate for the erecting with these resources (19), and, below, we estimate the construction time (5.3 hours).

If the task is accomplished under conditions differing from the normal, correcting coefficients are used for the time required to complete the tasks, also introduced on the reverse side of the rule.

In conclusion, we determine the requirement for transporting vehicles. With the slide over Field VII, we establish the apex of the span of the bridge (four meters), the amount of construction materials that will have to be transported (140 meters), and, opposite the category the load capacity of transport resources (Four - five tons) we determine how many vehicles are needed, or 32 (For the transport of 100 meters of

construction materials, 23, and, proportionately, 9 for the transport of 40 meters of materials.

THE EDITOR'S EDITORIAL

OUR PLANS

At the close of last year, the editorial staff went out to the readers with a request to answer the questions on our questionnaire: "What should be the nature of our Journal in the coming year?" The editorial mail brought brief answers to the questions, and also some expanded ones with an analysis of our work, and favorable answers, and critical answers, but all without exception were well-meaning. With each answer one could feel a genuine interest in making the Journal an interesting one, and the publications therein maximally useful and effective. We are trying to take many proposals of readers into consideration while we are doing our planning for the future of the Journal.

During the current year, in the traditional rubrics "The Route Marches of the Five-year Plan" and "Along the Road of Scientific and Engineering Progress", we continue the narration about the positive changes in the life of our society, about how the orders of the Party and the Government, which are directed towards strengthening our National defense, are implemented, and about the achievements of science and engineering. The articles about the experience of advanced military complexes, repair enterprises, and military training institutions, about the introduction of the achievements of science and engineering, about the latest methods of organizing production, about the battle for quality, etc. are planned to be published under the logo "The Achievements of Scientific and Engineering Progress in Terms of Their Practical Significance".

A large place in the Journal will be assigned, as formerly, to the propaganda data which have recommended themselves so well in the past in socialist competition and were directed towards intensifying military training: the battle for effective use of training time, the increase in the quality of field, air, and sea study, and the skillful ownership of materiel and weapons. Additionally, it is very important that in the units, on the ships, in the enterprises there should be created conditions for the participants under which each person can see his own work within the collective work, for example, in the mastering of the care for new materiel and in the economizing of resources. And the editorial staff sees as one of its tasks that of making everything that is valuable and that is related to things worthwhile a property of the common ownership.

The acceleration of the tempos in the scientific and engineering development of the country, the tranformation in the life of the Plans for scientific and engineering progress, the battle for savings and economy are all meaningless without

AD-B140 799 TECHNOLOGY AND ARMAMENT NUMBER 3 MARCH 1986 (TEKHNIKA I VOORUZHENIYE)(U) ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER CHARLOTTESVILLE VA 06 SEP 89 FSTC-HT-0569-88 F/G 15/3 2/2 USGO & CONT

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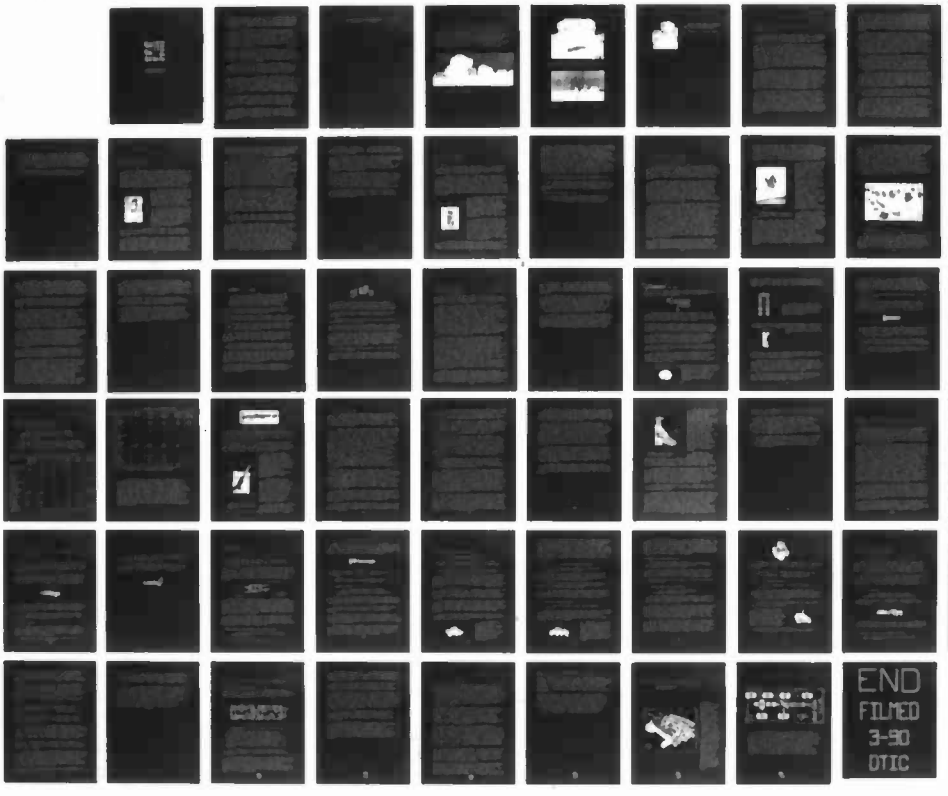

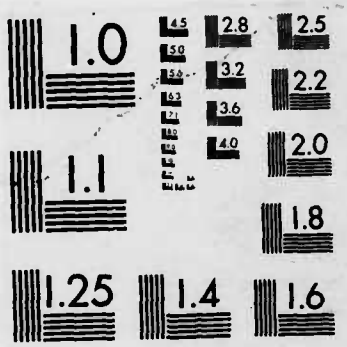

focusing one's attention on an understanding of the human factor. Our Journal continues the publication of outlines and sketches about engineers and technicians who are innovators, and masters of military matters whose daily labor with complete dedication and with creative penchant facilitates the national defense of our State.

Preparedness of complex combat complexes for immediate deployment, the accuracy of fire, and the conformation of the highly mobile subunits and units are provided by the efforts of many people. On the other hand, carelessness, a slack effort, and irresponsibility of one person may lead to a zero effort on the part of many. This is the reason that the matter of discipline has become such a big problem today. The Journal is planning to publish data disclosing the interrelationship between discipline and technology.

As in the past, such traditional themes in the Journal as construction and the military use of all types of materiel and weapons, the methods and means of engineering support of military activities, the improvement of the materials base for training, engineering and technical services, the experience of operating and repairing materiel and weapons, and invention and efficiency promotion will continue to appear.

New aspects of the illumination of these themes are suggested by the reader to a large degree. And, the greater his interest is stimulated and the more actively he thus takes part in the work of the Journal, the more the editorial staff is able to respond operationally to the matters that are interesting to many.

For example, in the current year, as evident from the mail, information published under the rubric "For Those Studying the Computer" attracted the attention of readers. This is understandable. Today, it is impossible to think of a single area of human activity -- whether it be production, scientific research, or the training process -- where computers would not be used. The Journal continues to publish information under that rubric. The new cycle will be devoted to microprocessor systems and their use.

Information under the rubric "In the Armies of Capitalist Countries" engenders an unflagging interest on the part of military readers. We continue to publish information under this rubric about the acceptance of new materiel models into the armament of such countries, and about military engineering surveys.

In response to the requests of many of our readers, we propose broadening the amount of reference material. Lists of recommended literature, annotations, and reviews of new books will be added to the individual articles. Also, we will publish announcements about the arrival of new books in the "Military Book" store.

And, as always, the editorial staff hopes to receive the kind advice and assistance of our readers.

IN THE MILITARY DISTRICTS, GROUPS OF FORCES, AND IN THE FLEETS

In the Red Banner Pacific Ocean Fleet, the personnel of the excellent Anti-Aircraft Battery commanded by First Class Specialist, Captain Ye. Suchkov, and competing under the logo: We will fulfill the decisions of the XXVII Congress of the Communist Party of the Soviet Union, and we trustworthily protect the achievements of Socialism!", anew have demonstrated a high mastery of effort. At recent combat firing exercises, the troops got an "excellent" rating for every rocket launching. As always, the materiel and weapons on the training ground performed reliably.

Rocket weapons on the march.

Captain Ye. Suchkov and Crew Chief Specialist First Class, Senior Lieutenant O. Filimonov.

Launch!

Senior Lieutenant V. Levchuk, Specialist First Class and the Chief of an excellent crew.

Photos by A. Aboronov and A. Romanov

FOR TRAFFIC SAFETY

ATTENTION, THERE IS A GLAZE OF ICE ON THE ROAD!

Major A. Kuz'min

In the transpiring winter-spring weather period, even more attention and caution is required of drivers than in the depth of winter because the iced-over road now, in addition, is covered with melted ice water, and has become extremely dangerous.

First of all, one must remember that in the spring one must drive in such a way that sharp braking action is completely eliminated. When a situation develops in which one must apply the brakes, it must be done as smoothly as possible, not using the clutch (The transmission of the rotating moment to the drive wheels preclude their being locked right up to the time the vehicle comes to a halt). Then, the probability of skidding will be less, and the strip of road over which the braking takes place will be shorter. But also in this case, one must remember that using the braking action of engine compression does not preclude skidding, and, if the strength of the traction of the wheels on the road turns out to be less than the braking action, slipping is inevitable.

It is desirable that one should brake before he reaches an ice-covered portion of the road. If he has not been able to see the dangerous section soon enough, it is necessary that he not run through the area without trying to do anything to avoid a skid, but should use spots where there is no ice to slow his vehicle down if it has become difficult to control (To this end, the shoulder, which one can drop the right wheels off onto and drive on with at least that side of the vehicle, is useful). When braking, one should grip the steering wheel firmly, and never, under any circumstances, allow the wheels to lock.

On snow covered and dirt roads, it is advisable to use a knurled track. But, it should be remembered that, in a track that is too deep, one can graze the housings of the drive units or of the steering mechanism on the high center of the road. Therefore, desirably, the speed should be held to 40 kilometers per hour. If a deep rut should be an obstruction, the vehicle should be halted, and pine branches or some other available material should be put down. Drivers which take sand with them during the spring season of bad roads are correctly approaching the problem. It can be very useful when one is beginning to tow a vehicle during the freezing time at night on a road covered with ice.

Sharp objects may be located in a deep knurled track under a layer of dirt and snow. In view of the fact that it would be impractical to probe the track, the vehicle should be driven at a slow rate of speed. If a front tire should be punctured, the driver should grip the steering wheel firmly with both hands. In order to preclude swerving and to hold a vehicle in its track, one should simply let up a little on the feeding of fuel, and, after the "swerving" has stopped, cautiously begin to apply the brakes.

When travelling cross-country and over virgin unaltered terrain with its depressions, soft dirt fills, and other similar obstacles, it is desirable to drive around them. If the obstacle is such that one can not drive around it, they should be crossed with only a small amount of fuel being fed, and at an almost direct angle. Under these circumstances, one should not turn the steering wheel sharply, and never shift the transmission. An attempt to cross such an obstacle at a sharp angle may occasion a significant twisting of the vehicle's frame, and, as a result of this, damage to the fasteners of individual components as well as to the components themselves may occur.

On a hillside, one should choose, wherever possible, a road with a thawed-out and dry soil surface. A vehicle may slide on wet ground. In order to prevent flipping a vehicle over, the driver should be constantly ready to turn the steering wheel in the direction of the downhill slope. Deep ditches, on the bottom of which water has collected under the snow should be driven around at slow speed in order to avoid the jars and jolts which are dangerous for the parts of the power train and the engine.

Often on a snow-covered clay section, the drive wheels spin or go into a skid, and a danger of slipping into the ditch has to be dealt with. Therefore, it is best to engage forward drive axle, to shift into the lower transmission range, and to drive at a slow speed without stopping or braking while avoiding sharp turns of the steering wheel. In especially difficult sections, it is necessary to use available materials (Brushwood, stones, or gravel), and snow chains as well.

In driving around barriers over plowed fields covered with spring thaw water, it is better to go in the lower transmission range with an even and unchanging feed of fuel. It is necessary to drive along a furrow or at a sharp angle to one.

As a rule, small areas of spring flooded meadow may be crossed with a start without using the lower transmission speed range and front wheel drive. It is not desirable to drive in the tracks of a vehicle which made the crossing earlier. If one does, the layer of sod will be ruined, and the track will be deepened. If the drive wheels of the vehicle, nevertheless, have spun, it is driven out after materials found at hand have been put down or added. One should keep in mind that, in the given case, "surging forward" with a vehicle, with sharp engagement of the clutch and increased crankshaft speed, usually worsens the

situation since the wheels dig deeper into the ground.

If the rear wheels on one side of the vehicle should begin to spin, it is recommended that one should brake the wheels. This causes the rotating moment on the spinning wheel to be transferred to the non-rotating wheel. After one or two attempts, one is usually successful in driving the vehicle out of the problem area of ground.

When getting a vehicle stuck in a depression, the method of "rocking" is used. This consists of rapidly shifting the transmission back and forth from forward to reverse. If "rocking" does not yield any results, it is recommended that you should cut off the edge of the depression and place dry branches, cinders, stones, or cruched bricks under the drive wheels.

It is necessary that one drive a vehicle extremely carefully on untravelled roads in the forest, trying not to collide with high snow-covered butts of trees and brushwood lying under the snow so as not to strike these objects and put steering linkage and pipe lines of the brake system out of commission, nor to damage the radiator, oil pan, or the housings of the drive units.

If conditions require driving over bushes or small saplings, it is necessary to choose a route without stumps or deadwood. It is recommended that glass, headlights, and parking lights, the radiator, and other parts of the automobile which may be damaged be covered with plywood, cardboard, or branches. One may drive through a tree-felling area only under the greatest of emergencies, and then when it is possible to maneuver freely between the stumps.

If one has departed on a solid road, one should then, by depressing the pedal a few times, dry out the water soaked brake shoes. The water which has leaked into the area between the brake shoes and the brake drum is in a way a kind of lubricant, sharply reducing the effectiveness of the braking action. Having made certain that the brakes are operating normally, one may stop this trial braking done to remove the moisture.

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TECHNICAL TRAINING EQUIPMENT

EXERCISES ON A TRAINING SIMULATOR

Lieutenant Colonel V. Aref'yev, Graduate Engineer

The Mechanic-Driver PTS-2 Training Simulator was designed for introductory training, but it may be used for training Third Class Mechanic-Drivers also.

The cab of the simulator is a single-seat closed type. All of the simulators of controls are situated in the same position as they are in the actual vehicle. The electrical terminals compartment is located in the forward part of the cab. The instrument support beam with its data display board, the instrument panel for the mechanic-driver, the control panel for the distribution box, the engine running-time meter, and the manometer simulator of the air-release system are located beneath the windshield opening. One-way-talk communication loudspeakers, a sound-type alarm, a loudspeaker for sound-imitation of the operation of the engine, and a control stick simulator of the drive control levers are mounted on the forward inclined plate.

Commands transmitted by the instructor and errors committed by the students appear in light on the data display board. It consists of panels and 18 transparencies which have appropriate inscriptions. When a mistake is lit up on the data display board of the training simulator, this offers the possibility of using this information for self instruction.

A schlieren projector installed in the simulator above the work station of the trainee simulates the situation. It consists of a frame with a chassis and a hold-down mechanism fastened to it as well as a point-source light, a spheric transparent disk (A model of the local area), and drive mechanisms. The disk is driven by two electric motors. Each of these is connected with drive rollers through a clutch and reduction gear. The control of the rate of movement of the disk and of the turns it makes is initiated from the work station of the trainee.

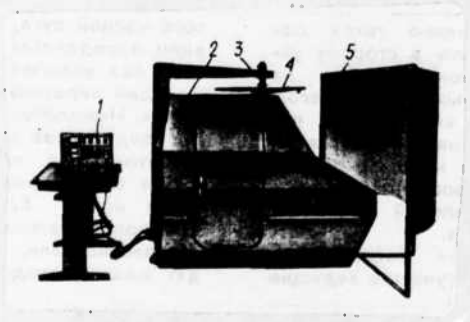
Turning on the training simulator, control of the trainee's activities, and the rear operations of approporiate regimes are carried out from the instructor's panel. Communications with the trainee are initiated with commands using both sound and light. The sound commands are given when it is necessary to make the task more difficult or to find out the route of movement which is being simulated by the schlieren projector on the display screen. For this purpose, a microphone is located in the well of the side wall of the panel housing. The instructor simulates emergency regimes with the light commands, turning the appropriate tumblers

for that purpose.

The light board of the panel permits one to test the position of the control devices of the training simulator, and reveals errors to the instructor. The pulse meter records the number of arrivals from the assigned route of movement.

There are four disks in the training set. The fundamentals of driving are developed using Disk No. 1: starting from a stop, shifting the transmission, turns in the driving movement, braking, and coming to a stop. With the aid of Disk No. 2, the trainees are taught to cross obstacles and limited passageways. When developing skills in crossing water barriers, in hauling vehicles on a water-crossing conveyance and in making crossings with materiel, as well as in driving vehicles in water, Disk No. 3 is used. The training in the accomplishment of all of the enumerated operations is carried out with the aid of disk No. 4.

In the initial training, the entire training program is divided into three phases: the preparatory, the basic, and the concluding phases.



The Training Simulator for the Mechanic-Driver of the PTS-2 Amphibious Tracked Transporter: 1 is the Instructor's Panel; 2 is the Cab; 3 is the Schlieren Projector; 4 is the Projection Disk; and 5 is the Screen.

In the preparatory stage, the general construction of the Training Simulator and the safety measures for use when conducting training on it are studied. The trainees develop skills in their actuation of the control devices when readying the engine for operation (Summer and winter), in starting the engine, and in starting up from a stop (on a level surface, up hill, and down hill). It is necessary to strive for a correct

beginning for the mechanic-driver, to teach him to actuate the levers and pedals of the drive system, of the engine fuel pump, of the main clutch, of the transmission, of the planetary steering mechanism, and of the control stick. The trainee should not let the control and metering instruments out of his field of vision, and should be able to quickly and correctly evaluate what they indicate.

As a rule, on the first training sessions the mechanic-driver will forget to check the position of the control levers and pedals, to give the sound signal, to release the air out of the fuel system, and to turn the crankshaft before feeding more fuel. The oil pump is not always started simultaneously with the depression of the starter button or the button for the air starter system. Before the engine is turned off, the rpm of the crankshaft should not be reduced (Up to 800 rpm) and with subsequent operation for 12-13 seconds. The supervisor should pay particular attention to how the students do this.

The objective of the basic stage is training in driving the arphibious tracked transport on land and in the water. In the beginning of this stage, as experience has shown, the following errors are typical. Often, especially in the beginning of the training, when going from the lower transmission range to the upper range, double clutching is not used, and from the upper range to the lower, "throttling" is not carried out. In turning, when changing the control levers for the planetary mechanisms for turning in the first or second position, the mechanic-driver forgets to increase the feed of fuel. After the introduction of "The transport has floated", the trainees do not always engage the propellers, and when switching the propellers to "Forward" or "Backward" they do not reduce the feed of fuel or hold the transfer switches in the neutral position.

In the concluding stage, test exercises are carried out in which the level of preparation for controlling a vehicle are checked.

In the training exercises on the improvement of skills, the exercise supervisor should increase the difficulty of the training task. For example, when readying the engine for winter operation, after the operations are completed for starting the preheater, one may give the input: "The familiar buzz of burning fuel is not heard in the preheater pot". In this case, the trainee should switch the cut-off switch of the electromagnetic valve to the position "Blown out", and the change over switch of the electric motor (After 1-2 minutes of operating without adding fuel to the pot) to the neutral position and repeat all of the operation for starting the preheater. While starting the engine in winter, the input "Charged storage batteries" or "Air pressure below 60 kilogausses per square centimeter", the supervisor of the exercises strives that the activity of the trainees should be in accord with the rules of the combined starting of the engine.

With the inputs "The transporter is loaded with input of soil, sand, or deep snow", "The temperature of the surrounding air is below −30° centigrade", and "The vehicle is parked on a slope with an incline of 25-30 degrees" may be used to complicate the training task of starting the vehicle from a stop. To start the movement of the vehicle in that case, it is necessary to engage the lower speed stage of the planetary turning mechanism on the first transmission.

As experience has shown, an accomplished utilization of the training simulator allows for a significant reduction in the time necessary for developing the skills in driving the vehicle.

YEARS, EVENTS, AND PEOPLE

YAKOVLEV, ALEKSANDR SERGEYEVICH

Colonel B. Baranov

Member Correspondent of the Academy of Sciences of the USSR, Colonel General of Aviation, twice Hero of Socialist Labor, Winner of the Lenin and State Prizes, celebrated Soviet Aviation Designer, Aleksandr Sergeyevich Yakovlev, who will be 80 years old on April 1, began his designing activity already when he was a student in a school in Moscow. Initially, he was fascinated by aviation modelling, and then, along with members of the glider group of the school, built the ABF-10 Glider, which was registered at the Second All-Union Glider Contest in Koktebel'.

The first airplane designed by A. S. Yakovlev was a sport plane, the ANR-1 two-place light plane which he designed in 1927 while working as an engine mechanic in the aviation team of the Military Air Engineering Academy imeni N. Ye. Zhukovskiy. Pilot Yu. Piontkovskiy, when testing that plane, gave it a high rating.

A. S. Yakovlev enrolled in the First course of the Academy imeni N. Ye. Zhukovskiy in 1927. During this training, he halted his designing work, and built several more light-engined craft. After finishing the Academy, in 1932 A. S. Yakovlev created the "Flying Automobile", the AIR-6, and then a two-place monoplane, the AIR-7.

A. S. Yakovlev was assigned as Supervisor of the Design Bureau for Airplane Construction in 1934. The young creative Group developed the UT-1 and UT-2 Student Trainer Airplanes in 1935-1936.

The Soviet Government gave the aviation designers, towards the end of 1932, the task of developing in a brief time frame combat airplanes which, in terms of their quality, would be on a par with the best foreign models, and would even be superior to them. Soon the Group of the Design Bureau designed the YaK-1 Combat Airplane. The top speed of this plane at 3400 meters altitude reached 600 km/hr. A 20-mm ShVAK [Shpital'nyy Aviation

Large Caliber Machine Gun] and 12.7 mm Machine Gun were installed on the fighter. In the initial period of the Great Fatherland War, the airplane was superior in terms of quality and armament to the best German fighter, the Mye-109Ye [Messerschmitt]. Soviet Fliers gained many famed victories in the YaK-1.

Soviet Aviation passed the most difficult of tests with honor during the War. The personnel of the Design Bureau, supervised by A. S. Yakovlev, played a significant role in this. The YaK-7 Fighter was delivered to the troops as the next fighter airplane after the YaK-1 . Both airplanes were built under large-scale series production until 1942. Working on the further improvement of the airplanes, Yakovlev's Design Bureau developed the YaK-9 Fighter. This airplane was significantly superior to the YaK-1 and Yak-7. The lighter wings with metal spars (Replacing the earlier wooden ones) made it possible to increase the fuel capacity and strengthen the armor. The airplane was equipped with a 37-mm Gun and two 12.7 mm machine guns. The cabin windshield was fitted with bullet-proof glass. The YaK-9 was the heaviest frontal fighter during the War years. There were 16.770 of these fighters built in various modifications.

The last of the Yakovlev-built fighters taking part in the Great Fatherland War was the YaK-3, built in 1943 and on the eve of the battle of Kursk. The airplane could attain a speed of 650 km/hr and reach an altitude of 5000 meters in 4.1 meters. The enemies of Soviet pilots were successfully downed by our pilots flying the YaK-3. The airplane could reach a speed of 650 km/hr and an altitude of 5000 meters in 4.1 minutes. Soviet pilots successfully downed the enemy in the YaK-3. French pilots in the "Normandy Naiman" Regiment fought in these airplanes. The YaK-3 was recognized as the best fighter of the Second World War. A speed of 745 km/hr in a YaK-3 with a VK-108 engine was achieved in 1944, the greatest speed reached by a Soviet piston-driven airplane.

The YaK-1, YaK-7, YaK-9, and the YaK-3 made up the basic fighting fleet of our fighter aviation. Of the 62,000 fighters built during the years of the Great Fatherland War, 36,000 had the "YaK" name.

The personnel of the Design Bureau headed by A. S. Yakovlev always strived to foresee the future. The War was still going on, and in the Design Bureau they had already begun the development of the jet airplane. The YaK-15 Jet Fighter was built in the fall of 1945, and, later, the YaK-17 and the all-weather YaK-25 with radio-direction-finding sight, and the Soviet YaK-28, the first Soviet supersonic bomber appeared. The first Soviet vertical take-off and landing airplane was built in 1967. The Design Bureau of A. S. Yakovlev developed the troop-carrying glider, the YaK-14, and, in 1952, the YaK-24 double-rotor helicopter, which was at that time the most powerful in the world. Two world records for lift capacity were established in this craft in 1955. The Yakovlev Design Bureau also made a significant contribution to the construction of training and

sport airplanes. The family of "YaKs" has been enlarged in recent years with the addition of the YaK-40 for local transport and the YaK-42 one hundred twenty passenger middle-distance-lines jet passenger airplanes.

All together, around 80 series type airplanes were developed under A. S. Yakovlev's supervision. All of these possessed such distinctive design traits as an optimum relationship of dimensions and weight of the airplane with engine power, technology of design, and relative simplicity of control. A. S. Yakovlev is still full of creative ideas as he was in the past. The Design Bureau supervised by him is working on further improvement of aviation materiel.

A. S. Yakovlev has been awarded the Tenth Order of Lenin, the Order of the October Revolution, the Second Order of the Red Banner, the Order of Suvorov I and II Degrees, and other orders and medals for his great service to the Fatherland in aircraft design. Aleksandr Sergeyevich Yakovlev combined his designing activity with activity for the State. He fulfilled a responsibility as the Deputy People's Comissariate and, later, as Minister of the Aviation Industry of the USSR between 1940-1946.

A NOTE FROM THE EDITORIAL STAFF. The Editorial Staff and Editorial Personnel of the Journal "Tekhnika i Vooruzheniye" congratulate Aleksandr Sergeyevich Yakovlev on this anniversary, and wish him good health.

YEARS, EVENTS, AND PEOPLE

GORLITSKIY, LEV NIKOLAYEVICH

N. Tyurin

The well-known designer, twice Winner of the State Prize of the USSR, Lev Izrailevich Gorlitskiy was born into a worker's family on March 3, 1906 in the village of Stepantsy in the Kanevka Region of the Cherkask Province.

L. I. Gorlitskiy enrolled in the Mechanical Studies of the Kiyev Polytechnical Institute in 1928, and was transferred to the Leningrad Military Mechanical Institute in 1930. Upon finishing this Institute, he was sent as an engineer to the Artillery Design Bureau at the "Red Wayfarer" Plant. There, he took part in the development of the 45-mm Anti-Tank and the 76-mm Division Guns. L. I. Gorlitskiy was assigned to the Design Bureau of the Artillery Academy imeni F. E. Dzerzhinskiy in 1935, where he took part in the design and development of the blueprints of a 37-mm aviation gun.

L. I. Gorlitskiy was assigned as Chief Designer of one of the Leningrad plants in 1936. Here, under his spervision the 76-mm Mountain Gun, the 107-mm Mountain Howitzer, and the 200-mm Sea Weapon were developed. Here also work on the modernization of models of artillery weapons that were in the armament of the country was being carried out.

L. I. Gorlitskiy became the Chief Designer of the Kirovsk Plant in August of 1940. From the very first days of the Great Fatherland War, the designers of that Plant assisted in arranging for the output of artillery systems. They also travelled to the front in order to help in the assembly of weapons in the fortified regions on the access routes to Leningrad.

L. I. Gorlitskiy was assigned as Chief Designer of Uralmash [Ural Heavy Machine Building Plant] and Chief of the Design Bureau. The personnel of the Design Bureau developed the SU-122, SU-85, and the SU-100 Self-Propelled Weapon on the chassis of the

T-34 Tank. These performed excellently in battle with the enemy. The designers constantly communicated with the front, and studied comments from the troops about the weapon which they had developed. This weapon could aid the Plant in systematically improving the combat quality of the combat weapons concurrently as production was being increased. Under the spervision of L. I. Gorlitskiy, the production technology for the stamped out tower for the T-34 Tank was developed. Up to that time there had never been produced neither in our country nor abroad a similar stamping of armor sheet metal in such dimensions and in such thickness. In comparison with a poured stamped tower, this one contained less metal, did not require a great deal of machining, and it did not require a very large production area for the manufacturing process. All of this had a great significance for the organizing of mass production of the T-34 Tank.

In the post-War years until he went on pension, L. I. Gorlitskiy was the Main Designer of one of the defense plants.

Lev Izrailovich Gorlitskiy has been awarded the Order of Kutuzov II Degree, the Order of the Fatherland War I Degree, Two Orders of the Red Star, the Order of the "Symbol of Honor", and many medals for his great service in the development of military materiel.

A NOTE FROM THE EDITORIAL STAFF

The Editorial Staff and the Editorial Personnel of the Journal "Tekhnika i Vooruzheniye" congratulate Lev Izrailovich Gorlitskiy on this anniversary, and wish him good health.

INVENTION AND EFFICIENCY PROMOTION

IN THE INTEREST OF COMBAT READINESS

Colonel A. Burdenko and Colonel V. Revuka

At the close of last year, in the GSVG [Group of Soviet Forces, Germany] the XVII Conference of Inventors and Efficiency Promotors took place. Lieutenant general N. Kalinin, the First Deputy Chief Commander of the GSVG made a report entitled "On the condition of invention and efficiency promotion work and the development of mass scientific and technical creativity in the Group".

He noted that the soldiers of the Group had successfully accomplished their accepted socialist obligations, had striven for the outlined successes in combat and political training, which to a large degree had facilitated the use of valuable suggestions of the innovators. Their creative energy, their search for operational expertise are directed towards further increases in combat readiness, towards the development of a modern training and equipment base, towards increasing the effectiveness and quality of operation, towards the maintenance and repair of weapons and materiel, and towards economical use of State resources and material costs.

Well-timed planning of innovative work, the conduct of all of the measures that have been provided, the active collaboration in the development of this work in Party and Komsomol organizations, the popularizing of innovative work on the pages of the Group newspaper, "Sovetskaya Armiya" ["The Soviet Army"], and in the transmissions of the radio station "Volga" have been proposed to the creative groups, and to the commissions on invention of the formations and units for the solving of real life tasks. The interest in technical creativeness has aided the troops to more effectively deal with the complex models of military materiel. The conferences of efficiency promotion personnel conducted in the formations and units of the Group with technically creative exhibits, the reviews of efficiency promotion work, the special months for collection of efficiency promotion suggestions before the beginning of the summer and winter training periods -- all of these things have energized the innovative activity of the personnel, and made it more goal oriented and effective.

The suggestions of the innovators have found widespread application facilitating the intensification of the training process and increasing the quality of the training of the personnel. Among the personnel, the work on the provision of equipment and materiel to the classes was accomplished by a group

of efficiency promoters under the supervision of Captain A. Gvozdev and Senior Lieutenant S. Bobylev. One may also classify the testing and training set for tank firing training exercises in the artillery training school as having been one of the best efforts. It was developed by the efficiency promoters with Major V. Chashchinyy at the head of the program. This set permits the crews of three tanks to conduct firing training at a realistic distance at pop-up targets and without expending ammunition.

On the Photo:
Lieutenant General N. Kalinin, the First Deputy Chief Commander of the GSFG.

A great deal has been done by the innovators in repair enterprises. This was facilitated by the development of creative initiative groups, the equipping of efficiency-promotion rooms, and the use of visual aids agitation. Technologists and shop foreman and engineering and technical workers of the divisions make a significant contribution to the development of efficiency-promotion work. They aid the innovators in the choice of subjects, in the solution of one or another technical problem, in the formulation of the efficiency-promotion suggestions, and in making the attendant calculations.

The repair personnel of the Group have developed and put into practice a number of valuable suggestions. For example, Senior Lieutenant S. Beda, Warrant Officers B. Kobets, A. Kopeykin, and also among those serving the Soviet Army, G. Murav'yev, developed an independent field complex for the repair of military aviation materiel, which has afforded the improvement of its technology, has increased the quality of repairs, and shortened the time frame for carrying them out. A spot welding device for difficult-to-reach places, which has increased the labor productivity by several times, was developed by Major N. Bondarenko, Warrant Officer N. Zybinyy, and V. Savich, who is serving the Soviet Army. Lieutenant Colonel V. Mal'chenko and A. Zalinskiy who is serving the Soviet Army developed an interface terminal for transmitting information from one computer to the other.

The cooperation between efficiency promoters of the GSFG and innovators of the NNA [National People's Army] of the GDR [German Democratic Republic] is being strengthened year by year. Many formations and units of the Group carry out combined measures which facilitate the development of technical creativity, e.g.,conferences, exhibits, and meetings for sharing of experience. For example, at an exhibition of the work of innovators of the NNA of the GDR, 14 exhibits were presented which were manufactured according to suggestions of the efficiency-promoters of the Group. Among them is the suggestion of Major Yu. Raguzin, which is a device making it easier for the mechanic-driver to determine the performance parameters of the operational regimes of engines with the help of an inspecting instrument; an on-board instrument for evaluating the excellence of a tank-driving performance; and an alarm for the presence of a concentration of carbon monoxide gas.

On the photo:

In the Presentations Conference Room.

Also in that exhibition, combined developments of innovators of the GSFG and the NNA GDR were exhibited. One of these, a radio relay station training simulator makes it possible to carry out initial training of ccommunications specialists. Captain S. Negatin, Captain of the NNA GDR N. Verner, and Warrant Officer A. Kondakov took part in this development. Another innovation is an attachment for cutting threads in blind holes. This was

accomplished by Senior Lieutenant A. Rabinovich with coauthor Mr. E. Uiglyaube of the GDR. With the use of this innovation, the accomplishment of work-intensive operations on materiel was made easier.

On the photo:

Major A. Korotkevich, Captain of the NNA GDR N. Verner, and Warrant Officer A. Kondakov stand by the exhibit which was manufactured jointly by innovators of the GSFG and the NNA GDR.

The reporter noted the deficiencies along with the successes which still interfere with the activities of the innovators. So, there are cases of bureaucratic red tape during the inspection and introduction of efficiency-promotion suggestions. Often commissions on invention introduce vague decisions with no real binding requirement for any results. From them one can not find out by whom and when the suggestion is to be put in effect. Sometimes the responsibility for introducing a suggestion is encharged to its author who, as a rule, has neither the time nor the means to implement it.

The organization of the work for the sharing of experience has also become bereft of the desire for the best, as well as the publication of technical information. Often suggestions which promise a widespread usefullness remain the property of only one

unit because the commission on invention did not send the information on it to the higher staffs.

There are staffs which are not developing the suggestions, are not relating the subject tasks in the suggestions to the personnel, are not promoting the experience of the innovators, and are not creating the approach recommended by the efficiency promoters.

On the photo:
Lieutenant Colonel N. Blokhin shares his experience with the participants in the conference.

During the breaks between the sessions, the participants at the conference become acquainted with the exhibits of technical creativenes, and share the experience of the work. The electrification training simulator manufactured by Senior Lieutenant V. Grigor'yev inspired a great deal of interest. With this device, the crew of a combat vehicle may develop the time standards for loading and unloading allottments of ammunition, the procedure for readying apparatuses for operation, and the sequence of operations during combat firing. Interesting developments aimed at the improvement of the quality of servicing and repairing of stationary materiel were also presented at the exhibition. Thus, Lieutenant Colonel A. Krikyn and V. Gunderev, who is serving the Soviet Army, acquainted the participants with

the exhibits having devices for adjusting the cover of the rear of the tracked prime movers MT-LB, MT-LBU, and 2S-1. This device makes it possible for a departed repair brigade to quickly and effectively rebuild tracked vehicles damaged under field conditions. Warrant Officer N. Klimov has developed a device for removal of a roller from a tank or a BMP [Infantry combat vehicle] without disconnecting the track. The device allows one member of the crew to remove the roller in 20-30 minutes. It also was possible to become acquainted with other interesting innovations at the exhibition.

The participants of the conference received correspondence addressed to the personnel of GSFG. In this correspondence, in particular, there was a statement about the innovators of the Group seeing their obligation as a need to still more resolvedly develop a large-scale scientific and technical creative spirit, to work more sacrificially for the transformation into reality of the Party plans that have been decided upon, to more actively participate in socialist competition aimed at increasing the combat readiness of the organizations and units, the improvement of the combat expertise of the troops, the growth of work productivity, and the optimum use of available reserves.

Photos by A. Obokhovskiy and the authors

THE COMPUTER IN THE PEOPLE'S EDUCATION

Colonel L. Alekseyev

Perhaps one of the brightest developments in scientific and technical progress at the present stage is the widespread introduction of computer technology into all spheres of man's activity. A particular evidence of that was visible in the exhibit "The Computer in the People's education" which was made at the VDNKh [Exhibit of Achievements in the National economy] of the USSR.

Computer technology today has taken a firm position in the secondary and higher instutions of learning of the country. It aids in increasing the effectiveness of the education process, scientific research, and the automation of the control processes of the learning institutions. Additionally, it makes it possible to successfully solve a number of problems connected with the limitations on the instruction time period and the continually growing volume of information necessary to be assimilated.

At the exhibit various kinds of systems and complexes were shown, at the base of which laboratory work and practical exercises were conducted including technical equipment for presenting information, self education, testing of knowledge, various training simulators, automated training systems, etc.

One of the exhibits was the MIRS [Multi-purpose heirarchically distributed system] on the base of mini- and micro-computers, and designed for the development of data processing classes and automated development systems. Computer programming and methods of automated developing, designing, technological structuring of production, the conducting of computational work, and the modelling of various processes may be taught using these systems. In individual education, the computer makes it possible to test knowledge, and develop skills and abilities. In collective education, the computer makes it possible to carry out practical games. The system also provides information servicing and documentation of the results of work.

The software is of a general system nature, and has a three-level structure, which facilitates organizing the equipment in three versions, i.e., as a grouping of displays interfaced with mini- and micro-computers and having external magnetic storage, as a grouping of computational display complexes built on the DVK-1 Micro-Computer, each of which is interfaced with a mini-computer and functions under its control, or as a grouping of displays or DVK-1s interfaced with external magnetic storage devices, each of which in turn is connected with a mini-computer.

In the process of developing the methods of using the system, a number of its distinctive characteristics are considered. This is oriented towards the non-professional user, the possibility for any of the users to simultaneously operate in any of the display terminals simultaneously, invariance with the basic types of computer use in the training process, and access to graphic peripheral complexes of automated work stations.

The multi-purposeful nature, the available software, engineering, and language resources of the system afford the provision of uninterrupted and complex training of specialists by various faculties and a commonality of software and hardware resources to develop and to broaden the methodological teaching procedures in terms of the movement of students from course to course.

The complex for the methodological, technical, and organizational provision of uninterrupted training of students in the radio-technical specializations, which was presented in the exhibit, was almost as universal as the one we have been describing. It incorporates a data processing center (The YeS 1045 and SM-4 Computers) and display and training groupings. The latter is equipped with technical training equipment. Practical and laboratory exercises are being organized for the system to be based on, and practical data processing operations are being carried out. This is characterized by a rich methodological support, e.g., lecture summaries, teaching aids, slides, video-recordings, programming test cards, etc. The complex has been introduced in a number of higher institutions of learning of this country and abroad.

The AOS [Automated training system] has been exhibited a great deal. It is distinguished by the scope of problems which it solves, the roster of technical equipment, and the software. Thus, the "UNISON-1" system serves as an instrument for making up training courses on the SM-3, SM-4, SM-1410, and SM-1420, and for conducting training in those courses.

A specialized software system on the "Elektronika DZ-28" Micro-Computer and designed for automating the processing and storage of training courses is used also for training and testing of students' knowledge in the individual dialogue with the computer regime.

These functions are automated training and knowledge testing, but in the computer software area, the AOS is built on a YeS Computer and the "Grad" graphic system. The information is made available to the student in textual form, formulas, graphics, drawings, and diagrams of dynamically changing representations. Active training methods, mathematical modelling, and practical games in various disciplines are accessible for it.

The development, adjustment, and operation of automated training courses in display groupings which are equipped with series-produced displays adapted for the retrieval of statistical and dynamic graphics representations makes it possible to organize an AOS built on an YeS Compyter and the "grad" graphical system. The information is presented to the student in textual form, formulas, graphics, drawings, diagrams, and dynamically changing representations.

Many systems and complexes were shown in the exhibit, which are used for the elevation of the effectiveness of training in the individual disciplines as well as unified according to a number of fundamental, general and specialized engineering courses.

Among the exhibits there were also some which may be used not only in the training process, but also in industry. For example, the software system of automated development of technological processes is of this category. It consists of a PPP [Packages of applied programs] "Tokar'", "TAO", and "Technical Progress". The first is a system for optimizing cutting regimes. With this system, one can make an analysis of the single-tool set up for lathe operations according to one of the following criteria: unit output rate, life of the tool, cost of the tool, and productivity of the operation.

The "TAO" package of applied programs was designed for the technical standardization of abrasive processing operations (25 types). It makes it possible to determine the specifications of a grindingf tool, to calculate the cutting regimes and the standards for cutting rate, and to formulate and type an operational technological chart. The technological production line route for series production conditions is planned on the basis of a group technological process by using the PPP Tekhprotsess".

Systems and complexes were demonstrated at the exhibit, which are used for increasing the effectiveness of training-research and scientific research work. Exhibits were widely displayed, which were designed for automating the control of the activities of training institutions.

For example, the automated multi-functional system for the formulation of the contents of training courses. This system operates in a dialogue regime. The users are workers engaged in the training of specialists on scientific and technical information, the teaching and professorial staff, course auditors, and students. One may derive the qualificational characteristics for new and active specializations with this system. He may predict new specializations for higher institutions of learning, for determining the necessary disciplines for them, formulate an inventory of active specializations on the basis of an evaluation of their relevance and significance. Additionally, one may develop yearly and five-year plans; training plans; training methodology plans and

programs; and apportion training time among disciplines, divisions, and subjects and according to training methods. The system makes it possible also to carry out information retrieval and distribution of methodological training plans and programs, store information about recommended literature, the most important scientific and technical achievements in the area of theory and practice in scientific and technical information, and distribute tasking for work that is output.

And the system of integrated use of electronic data processing technology in the training process was designed to solve a broad range of tasks. This system as well as a number of other developments was demonstrated at the exhibit.

The necessity for active introduction of data processing and electronic computer technology into the education process is ordered to be among the basic directions of economic and social development in the USSR for the years 1986-1990 and for the period up to the year 2000. The exhibit dedicated to the use of the computer in the people's educational system has shown that there is a realistically large base for the successful accomplishment of that task.

RECOMMENDED FOR INTRODUCTION

This information is based on data making up the inter-industry branch exhibition "The results of the work of the construction ministries on the provision of repairs, technical servicing, and the operation of construction equipment" at the VDNKh [Exhibit of Achievements in the National Economy] of the USSR.

A Univeral Self-Erecting Scaffold has been designed for the repair, and preventive and technical maintenance of wheel tractors, excavators, and motor vehicles.

The Scaffold consists of lower and upper frames joined in hinge fashion to four supports. Two hydraulic cylinders having a piston rod travel of 1000 mm serve to raise the upper frame.

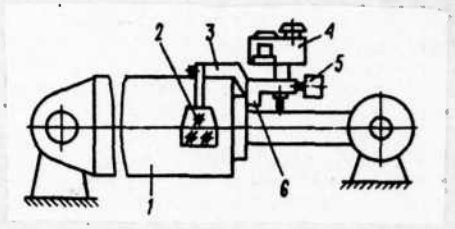
In the rear part of the frame, a pump station consisting of an electric motor (4.5 kilovolts, 1450 rpm), an NSh-10 Pump, a hydraulic tank, an R-20 hydraulic distribution device, and a control lever have been installed.

The hydraulic distribution device, which is connected to the hydraulic cylinder with pipe lines, serves to raise the upper platforms. Four folding supports in order to prevent a spontaneous lowering of the trestle when loaded in the raised position.

The introduction of the Scaffold into use has raised labor productivity, improved the working conditions of repairmen, and shortened the time that equipment must remain in for repairs.

The lifting capacity of the Scaffold is 25 tons per second, the width is 3000 mm, the width of the treadway is 3000 mm, and the height is 480 mm when folded down, and 1200 mm when raised. The length in folded state is 7500 mm, the length of the lift surface of 6000 mm, the the time required for erection (To a height of 1200 mm) is 45 seconds.

A Device for Measuring the Wear on Aligning Parts of Hydraulic Cylinders (Guiding Sleeve and Pistons) allows the wear that is present to be evaluated without disassembling the hydraulic cylinders.



The Device is constructed in the form of a Bracket 3 fastened with screws 2 to the barrel of the cylinder 1. A Vibrograph (VR-1)4 is mounted on the Bracket with a screw 5. A projection on the Bracket 6 fits against the cylinder head.

The amount of wear is determined by recordings of the readings of the Indicator (ICh10MN) on the tape of the vibrograph.

The dimensions of the device are as follows: 180X200X240 mm, and the weight is 2.5 kilograms.

A Testing Unit for Testing the Hermetic Seal of the Central manifolds of excavators with hydraulic drives is increasing the quality and reducing the length of time required for repairs.

An electric motor is installed in the base and connected with a worm reduction gear through a V-belt drive. The manifold being tested is installed on a supporting and turnable device and fastened with bolts. Then, each section of the manifold is connected in turn with high pressure hoses from the pumping stations. A drop in pressure on the manometer indicastes a break in the hermetic seal of the section.

The measurements of the Unit are 500 X 600 X 900 mm, and the weight is 150 kilograms.

Attention Readers! More detailed information about the technical innovations or addresses from which one may obtain more detailed information will be sent by the Editorial Staff upon request.

DEVELOPED BY INNOVATORS

Major V. Zhurba, Senior Officer for Invention of the Red Banner Kiyev Military District

Inventors and efficiency promotors of the units of our Military District are making a significant contribution to the improvement of the training equipment base of artillery training schools, tank training areaparks, and training grounds.

Thus, in a complex of training equipment for training in firing for gunners and tank commanders in one of the units, alongside of standard training simulators, those which were developed by the creative group of efficiency promoters headed up by Officer Yu. Savchenko are widely used. Therefore, there are, for example, a training simulator designed for training gunners and tank commanders in shooting at moving targets with a large choice of initial data (It may be used both under field conditions and in the classroom), a training simulator for the initial training of tank gunners which provides training exhibited to observers, as well as testing by the supervisor of the exercises for the activities of the trainees, and observation of them by all of those present at the exercises. The training simulator enables the successful development of the assignments in training in firing in short time frames without using ammunition and technical resources.

Among these, a system for objective testing for quality of driving of combat vehicles has been developed in one of the schools by Officer L. Shaposhnik. This system distributes information in an automatic regime about the allowable errors and about the evaluation (On the display board) of the mechanic-driver during his carrying out of the exercise to the supervisor of the exercises. A very effective training simulator for training tank gunners, which was borrowed from one of the units, for the accomplishment of firing exercises is used in the training (The developer is Warrant Officer A. Panin). It affords the possibility of changing the initial data through a large range of factors. Among the borrowed items, is an electromagnetic brake for target installations (The developers are Warrant Officer N. Dyadyuk and serving in the Soviet Army N. Vykhovanets) and an electronic panel of target installations (Suggestion of Officer V. Bondarenko and serving in the Soviet Army S. Yefremov).

Technical innovations are being actively introduced in formations also where Officer G. Golubev heads the commission for invention. Not long ago, for example, there was installed a tank fire complex training simulator in the artillery training school. On these, the personnel study the how firing exercises are carried out by the personnel, and how they are improving their

skills.

Efficiency promoters also had an active participation in their development. The experience of related units was also used. Specifically, the complex training simulator for training tank crew members is designed and manufactured by the creative group headed by the active innovator Reserve Warrant Officer A. Belevtsov.

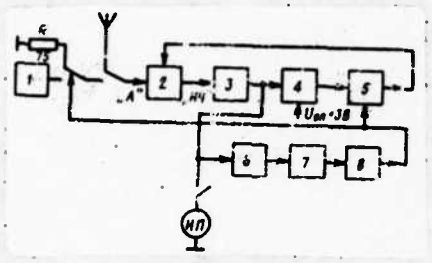
At the same time, there are units in which the innovators are not attracted to the work on the improvement of the training equipment base because the proper conditions for that have not been created for them, and operational measures for the widespread use of their developments have not been taken. At times, the introduction of valuable suggestions is carried out only in the location where the developers are serving, and, in other organizations and units, outmoded and less effective training equipment resources continue to be used.

The problem in the introduction is the fact that generally there is still not enough attention brought to the officers about the use of new resources in the training process. The staffs should more often practice the development and publication of recommendations and orders with respect to methodology in which describing these resources would not only be easy, but their adoption into the training process would also result from it.

The relay race of

~~THE RIGHT TIME OF~~ INNOVATORS

The following DIAGRAM suggested by Soviet Army Enlisted Men Yu. Bulychev and M. Yerunov proposes to test and measure the sensitivity of radio receivers.



The device consists of a source of support level 1, the radio station doing the checking 2, a rectifier 3 with a low frequency filter, comparators 4 and 6, an analog storage device 5, a liminal regulator 7, and a (relay) key 8.

A DEMONSTRATION OSCILLOGRAPH, designed to indicate on a large display screen of constant voltages and periodic processes with a frequency of 50 cycles per second or a multiple of it, has been proposed by Major V. Solovkin for use in the training process.

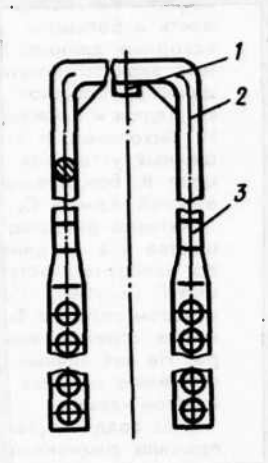
The oscillograph is a two-channel one. Oscillograms of voltages may be receivedd with amplitude from the tenth unit to the tenth volt in two different points of the devices being researched. Additionally, synchronizing pulses are being developed which have positive and negative polarity.

The oscillograph is built on a base of a black and white television receiver of the II Class (For example, an ULT-59 [A Unified Tube Televisor].

The time of delay of each of two videopulses distributed between intermittent synchropulses is proportional to the momentary value of the amplitude of the voltages being investigated, which are received at the inputs of the appropriate channels of the accessory.

A PLASTIC GLAZING CORD MANUFACTURING DEVICE has been developed by Warrant Officer V. Stogniy. The glazing cord is used for glazing glass panes into window openings. It is made in the form of a round plate with openings having different profiles.

A PUMP ROD SUPPORT DEVICE, the MShK-15, developed by Colonel F. Lebedev, makes it possible to have access to the filter of the MShK-15 Mechanized Worm-Gear Well in any intermediate position of these rods.



The device is a steel arch 1 and 2 on the ends of which plates are welded 3. A pin which determines the height of the supporting surface above the crosspiece of the frame of the drilling machine.

A REMOVER DESIGNED FOR DISASSEMBLING AND ASSEMBLING ANALOG DIAL INSTRUMENTS for their repair by Major A. Shevtsov. With this tool one can remove the arrows without damaging the pins or the dial.

A DEVICE FOR AUTOMATICALLY CHOOSING THE NECESSARY FRAME FOR A SLIDE PROJECTOR has been developed by Captain A. Shalayevskiy and Soviet Army Enlisted Man Ye. Bazarnyy.

The basic unit in the device is a six-element system of comparison which emits three signals "Larger", "Smaller", and "The same". The first inputs of the diagram are connected to the inverted output of the selector which gives the number of the frame. The second inputs are connected with the outputs of the reversing meters which count the number of frames.

When the signals coincide with the selector and with the meter of the comparison system, the signal "The same" is emitted, which indicates that the frame is selected, the carrier is halted, and the projection light is turned on.

In order to preclude false processing with respect to numbers which increases the number of frames in the carrier, a system of exclusion has been set up for numbers 37, 38, and 39. The system for turning on the projection is accomplished in such a manner that the slide projector may operate in the counting regime both in the "turned on" regime, and with the projection turned off.

The operation of the system is provided through a 0.5 cycles per second generator.

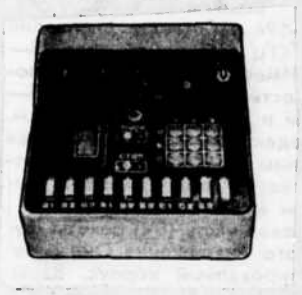
AN ARBOR FOR MOUNTING MILLING CUTTERS developed by Soviet Army Enlisted Man G. Dvornikov and Soviet Army Worker A. Gomozov makes it possible to machine parts with disk three-sided, grooved, half-round, and triangular milling cutters. The use of the arbor makes it possible specifically to mill grooves of the T-shaped and "Butterfly-tailed".

A TERMINAL DESIGNED FOR CHECKING SUPER-MINIATURE ELECTROVACUUM INSTRUMENTS without unsoldering them from the schematic, so Lieutenant Colonel V. Kachalov states. The terminal is made in the form of two panels, a control panel with an electronic time relay from a power transformer.

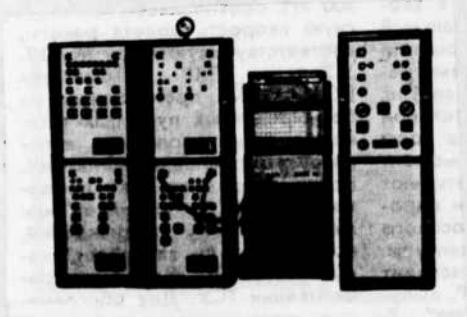
With the terminal, one can measure the inter-electrode resistance of a computer, determine the break in electrodes and brief shorts, and evaluate the emissive capacity of the cathode.

The current amounts to 36 volts with a frequency of 50 cycles per second. The required power is not more than 60 volts, and the dimensions are 180 X 155 X 95 mm.

A TRAINING SIMULATOR-EXAMINER DESIGNED FOR DETERMINING THE SPEED OF HUMAN REACTIONS was built by Captain G. Gladkiy and Senior Lieutenant I. Bolotin. The reaction time is tested with the instrument with an accuracy to a tenth of a second.



A BOOTH FOR TESTING CONNECTING CABLES makes it possible to check cables (With not more than 45 cores) mounted in sockets with voltage up to 220 volts, according to Lieutenant Colonel P. Yemel'yanov. The correctness of assembly, resistance, and reliability of the insulation are checked.



When working in checking in the booth, the number of the cores of the cable being checked, the checking regime, and the results of the testing are indicated.

The booth measures the resistance of insulation in the limits of 20, 50, 100 MO m 10 %, as well as testing for reliability of insulation under voltage of 110 volts 5 % of alternating current the amplitude of which increases according to the law of saw-tooth voltage.

The booth is built on four movable technological supports. The current is from an alternating current net with a voltage of 220 volts and a frequency of 50 cycles per second.

A LASER VIEWFINDER for cold tracer bullet firing from an artillery weapon has been manufactured by Major V. Makayenko and Soviet Army Enlisted Man N. Markov.

A standard TKhP-12-80 Cold Tracer Tube has been used, which has made it possible to turn 90 degrees and form a beam along the corner of the divergence up to 6 X rads. This makes it possible to receive a spot of light 5 mm in diameter at 10 meters distance from the viewfinder.

For adjustment of the view finder it is necessary to get a fix on an observed point as a target with a TKhP [Cold Tracer Tube], and to set up the viewfinder in place of the Tube. Then one must lead a colored spot to that very point, and fix the Laser. Oval openings on the flange of the adapter make it possible to move the beam in a parallel direction when necessary.

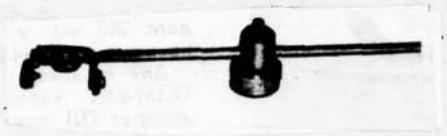
The weight of the Laser View Finder with the length of the cable does not exceed 1.1 kilograms, and the Current Panel not more than 4.1 kilograms.

AN ELECTRIC HEATING SHOVEL developed by Major V. Chernokhvost is used to remove compound from storage batteries. A nichrome spiral (Resistance = 36 Ohms) is mounted in the shovel. Current is drawn from a 36 volt source.

A LEAD, INDIR, AND BRONZE COATING BENCH provides a high quality of coatings, according to Lieutenant Colonel I. Tkachenko. Testing of the quality of the operation has been provided.

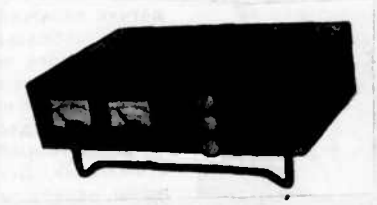
The dimensions of the bench are 2700 X 600 X1900 mm.

A MAGNETIC DEVICE has been designed for the "Plamya" [Flame] cutting torch installation which is used for cutting out metal blanks in circular or triangular strips.



The device is made up of a support, a magnet, and dividers.

A THREE-CHANNEL POWER SUPPLY UNIT designed for testing and adjusting of electronic systems was developed by Captain G. Gladkiy and Senior Lieutenant I. Bolotin.



The current source is assembled in integrated voltage regulators. Regulation of voltage is provided from 1.5 to 30 volts (Two channels) and from 12 to 30 volts (One channel). The current load goes up to one amp.

A MOVABLE TILTING CART mechanizes the pouring of oil and antifreeze from barrels of capacities of 100 or 200 liters, according to major V. Suchkov.

The tilting cart consists of a wicket-shaped frame on rubber wheels, a movable lever on which a holding band is fastened with a spring catch and a holder for the lever.

The barrel is made fast with the holding band, and is raised to a height of 150 mm and made fast. Then it is turned into the horizontal position, and by opening a special spigot the oil or anti-freeze is poured out.

The dimensions of the cart are 1500 X 740 X 600 mm.

RECOGNIZED AS AN INVENTION

A SYSTEM FOR DISTRIBUTING ACTIVE LOADINGS between parallel operating synchronic generators (Author's Attestation No. 1026237) which differ in comparison with well-known elevated

high-speed responses was developed by Colonel I. Ryabchikov and Lieutenant Colonel V. Dan'shin.

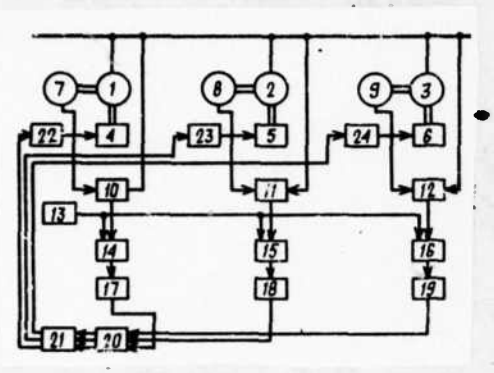
The increase in the high-speed response is achieved by using information about the value of the active loading of each generator during the time equal to the period between the moments of flow through zero value of the electromotive force and the voltage.

This method is implemented by using a special system of electrical supply which is introduced in the drawing.

The diagram contains synchronic generators 1-3, drive engines 4-6, supplementary generators (Micormachines) 7-9 on one shaft with the basic generators, analyzers of the signatures of the voltage of the net and micromachines 10-12, pulse generator 13, keys 14-16, calculators of the relative angles of load 17-19, calculator of the average value of the relative angle of load, an amplifier-transducer 21, and supplementary elements 22-24.

The micromachines operate in the idling regime because the phases of their output voltage coincides with the phases of the electromotive forces of the basic generators. The signals, proportional to the electromotive forces of these generators and to the voltage of the net, proceed to the analyzers of the signatures which are controlled by the appropriate keys.

The analyzers open the keys only when the signs of the signals do not coincide with each other, i.e., for the time determined by the angle of movement of the phases between the electromotive force of the generators and voltage of the net. In this manner, the number of pulses passing from the generator 13 to the inputs of the calculators 17-19 proportionally to the synchronic generator.



From the output of the calculator 20 to the input of the amplifier-transducer, signals pass which are proportional to the difference between the average value of the relative angle of loading and the relative angle of loading of each generator. The amplifier-transducer, through the actuating elements (step-type motors), actuates the control devices of the drive engines, changing their rotation moments in such a way as to bring the difference between the average value of the relative angle of loading and the values of the relative angles of loading of each generator to zero.

ATTENTION READERS!

The editorial staff will send you upon request more detailed information about the technical innovations or the address from which you may get this information.

IN THE MILITARY FORCES OF CAPITALIST STATES

ANTI-SHIP ROCKETS OF THE NAVAL FORCES

Captain of the First Rank A. Mikhaylov

Information and illustrations from foreign publications "Jane's Weapon Systems", "Military Technology", "Navy International", and "Defense" are used in this article.

In the navies of the leading capitalist countries, PKR [Anti-ship rockets] are used to arm both NK [Surface ships] and PL [Submarines]. Reportedly, they also may be carried by the airplanes of the navies. The technical tactical specifications of several anti-ship rockets are presented in the Table.

Basic technical tactical specifications	Types of rockets and developing country					
	"Harpoon" RGM-84A, UGM-84A (US)	"Tomahawk" VGM-109V (V-1 and (US)	"Exocette" MM-38 (France)	"Exocette" MM-40 (France)	"Otomat" MK1 (Italy)	"Otomat" MK2 (Italy)
Weight in kg:						
at launch	667	1225	735	825	730	770
warhead	225	450	165	165	210	210
Range in km:						
minimum	13	64	4	4	6	5
maximum	120	550	42	70	80	180
Cruising speed (In Mach numbers)	0.85	0.7	0.94	0.94	0.9	0.9
Type engine:						
cruising	TRD	TRD	RDTT	RDTT	TRD	TRD
booster	RDTT	RDTT	RDTT	RDTT	RDTT	RDTT
Dimensions in mm:						
casing length	4570	6250	5210	5650	4390	4460
casing diameter	340	520	350	350	460	460
width tail section	910	2540	1000	1140	1350	1350

Basic technical tactical specifications	Types of rockets and developing country				
	"Otomax-2" (Italy)	"Penguin" MK1 (Norway)	"Penguin" MK2 (Norway)	"Exocette" SM-39 (France)	ANS (France and FRG)
Weight in kg:					
at launch	...	330	340	655	950
warhead	100	120	120	165	165
Range in km:					
minimum	...	2	2	4	...
maximum	100	20	30	50	180
Cruising speed (In Mach numbers)	1.8	0.7	0.7	0.94	2.2
Type engine:					
cruising	TRD	RDTT	RDTT	RDTT	PVRD
booster	RDTT	RDTT	RDTT	RDTT	...
Dimensions in mm:					
casing length	...	2960	2960	4690	...
casing diameter	...	280	280	350	580
width tail section	...	1400	1400	1000	...

TRD = Turbo-jet engine RDTT = solid-fuel rocket engine PVRD = Ram air-breathing jet engine FRG = Federal Republic of Germany

In the US Navy today there are the following anti-ship rockets: the PKR "Harpoon" and "Tomahawk". The "Harpoon" is manufactured in two variations, the RGM-84A (For armament on surface ships) and the UGM-84A (For installing on submarines). It has a cross-shaped configuration formed by a straight-across short wing and folding control surfaces situated according to the standard aerodynamic arrangement. The wing (Trapezoidal in design) is built with a sharp profile angle of streamlining on the front edge. The wings on the rockets designed for arming submarines may fold up. This is the only design difference in the submarine-mounted rockets. The body of the glider is manufactured from aluminum alloy and divided into the following sections: the last stage, the warhead, the cruising engine, and the tail section.

The PKR "Tomahawk" BGM-109-B-1 in flight.

The on-board control and guidance system is situated in the last stage of the rocket and covered on the outside with a deflector of radiopermittive material. It includes an active radiolocation GSN [Self-guidance nose cone], an inertial system, a radioaltimiter, and a power supply.

The PR-53/DSQ-28 Self-Guidance Nose Cone is built of solid-state components, and, for better invulnerability to jamming under radio-electronic counter-action, it is capable of changing the frequency emissions according to a spontaneous procedure. It has a scanning angle of plus or minus 45 degrees.

The inertial system includes a digital autopilot computer, inertial control instruments and guidance (Three gyroscopes without universal joints are part of this system for determining the amount of deviation of the PKR from the assigned position in space, and there are 3 accelerometers which measure the accelerations of those deviations).

Launch of the BGM-109-B-2 "Tomahawk" PKR out of the water.

The AN/APN-194 active short-pulse radioaltimeter operates within a range of 4-8 henry cycles per second with a beam width of 13-15 degrees. It has a resolving capacity along the horizontal of 15 cm and along the vertical 5-10 cm. The transmitting and receiving antennas are positioned correspondingly under the last stage and the warhead.

The BCh [Warhead] of the in flight rocket contains a high explosive charge. It has a bronze-coated casing. A delayed action fuse goes into operation after the side of the target

ship's hull is penetrated.

The launch of the PKR "Harpoon" takes place from the PU [Launching installations] of the ZRK [Anti-aircraft rocket systems] the "Tartar" and "Terrier", the "ASROC" [Anti-submarine rocket] anti-submarine rocket complex, and from the TPK [Transport launching containers] of surface vessels. Such containers [Each weighing 280 kg] are mounted on a ship two or three together in a frame.

In order to launch the PKR UGM-84A "Harpoon" from a torpedo device, a capsule (6245 mm long and 533 mm in diameter) is used in the PL [Submarine]. The capsule is made of fiber glass and aluminum alloy. The capsule has a vertical stabilizer and two folding stabilizers. After firing the capsule from the apparatus, it possesses a positive floatibility, and exits from the water at a 45 degree angle. The transmitter for turning on the TSU [Expansion unknown] and explosive bolts simultaneously begins to operate at that moment. The bolts are for the separation of the nose section and the tail section of the capsule. Further flight takes place exactly as the PKR flight launched from a surface ship. Surface ships are armed with the BGM-109B "Tomahawk" Launch of the PKR "Tomahawk" Anti-Ship Rocket (This is the B-1 modified version), and submarines water. (This is the B-2 modified version.). The "Tomahawk" Anti-Ship Rocket is built in a standard aerodynamic plan. It has a wing of modest length and streamlining in profile, and four completely folding control surfaces. The outer wings are laid one above the other (Right above the left) in a special slot which closes up after they come out of the body of the rocket.

The rocket has a cylindrical fuselage with an ogival warhead, and it is divided into 6 sections in which are situated the active radiolocation GSN [Self-guidance nose cone] (Covered with a fiber glass shield), an on-board SUN [Control and Navigation system], a BCh [Warhead], a fuel tank, a cruising engine, and control surface drive mechanisms. The TSU is secured to the last section (Coaxially with the rocket). All sections are made of aluminum alloy with reinforcement elements. The airframe of the rocket has a special coating in order to reduce infra-red radiation.

The basic parts of the on-board SUN [Control and navigation system] are the following: the self-guidance nose cone, the inertial system, the radioaltimeter, and the power supply. All of these are an optimized variation of the parts of the on-board SUN of the PKR "Harpoon", and they have the same basic specifications.

The high-explosive BCh (Developed earlier for the Air Force rocket the "Bullpup") is equipped with a contact delayed action fuse which makes it possible to carry out its detonation inside of the target ship.

The F107-P-400 small engine was especially developed for the PKR. It has two rotors with a low compression ratio and an axial two-stage fan. The up-draft air intake is extandable. The thrust of the engine, around 300 kilogausses per second, supports a cruising speed corresponding with the number Mach = 0.7.

The launch of the BGM-109-B-1 PKR "Tomahawk" is carried out from armoured launch installations or torpedo devices situated on surface ships. The coating on such installations protects the PKR from metal fragments or mechanical damage, and, additionally, it protects the personnel during emergency operation of the TSU. The rocket is raised to a 35 degree angle with a hydraulic mechanism in order to operate the launch installation.

In order to launch the BGM-109-B-2 PKR "Tomahawk" from a submarine through the torpedo device, a special launcher made for that capsule of stainless steel is used. The capsule is filled with nitride under a low excessive pressure, and, according to the Western press, is capable of keeping the rocket in storage for an extended period. The capsule is loaded into the device in the same way as a standard torpedo. When being launched from a submarine, the BGM-109-B-2 "Tomahawk" rocket exits the water at an angle of around 50 degrees, and its later trajectory does not differ from the flight trajectory of the BGM-109-B-1 PKR "Tomahawk".

In France, specifically the "Exocette" anti-ship rocket has been developed and integrated into the French Navy in the modified variations MM-38 and MM-40. The PKR "Exocette" MM-38 is in the armament of all surface battle vessels of the French Navy with the exception of aircraft carriers.

This rocket is built according to the standard aerodynamic design. The wing is such that it gives the rocket the shape of a cross and, in the profile, the wing has an optimum streamlined shape from the point of view of its transonic speeds. A cross-shaped stabilizer is in the tail section with four aerodynamic control surfaces situated in the surfaces of the outer wing. The fuselage of the rocket has 6 sections in which the following are situated: an active radiolocation self-guidance nose cone; an ogival-shaped closed covering of radiopermittive material; an on-board control and guidance system; the warhead; the solid-fuel jet cruising engine; the solid-fuel launching booster, thermal batteries; and control system drive.

The active radiolocation RSN [Radiolocation control system] ADAS [French abbreviation; expansion unknown] (Weight is about 30 kg) is a single pulse type with horizontal stabilization of the direction plan. Its operation is actuated at 8-10 henry cycles per second. Reportedly, the self-guidance nose cone is capable of locating a large target at a distance of 24 kilometers. The on-board SUN of the rocket guides the rocket from the conveying ship within a 30 degree sector, and also it provides a programmed stable flight and a hit on the target.

The semi-armor piercing warhead (Identical for all modified versions of the rocket) produces a great number of fragments. It is equipped with a non-contact fuse (Situated in the RSN section and is an inherent element of that part) and a contact fuse. The latter, which are of a delayed-action type, results in explosion of the warhead inside of the target ship.

The cruising RDTT [Solid fuel rocket engine] is built of aluminum alloy. Its casing is the part which carries the airframe structure, and it has a heat protective coating. The RDTT's charge (Weight approximately 150 kg) burns in star-shaped forms of face burning. The launch of the RDTT is actuated by explosive charges. The operating time is around 110 seconds. The outflow of burning gases takes place from a centrally positioned orifice. The solid-fuel booster is of the same design, and it operates 2.5 seconds. The fuel charge of the booster weighs around 100 kg. The fashion of burning of the charge is radial, and the gases flow through two distributing orifices.

The configuration of the "Exocette" MM-40 anti-ship rocket is similar to the design of the MM-38 "Exocette". This makes it possible placing the MM-40 "Exocette" in a cylindrical fiber glass container. Reportedly, the engine installation of the PKR "Exocette" MM-40 is more powerful than the PKR "Exocette" MM-38. Its cruising RDTT is made of steel. It is asserted that this has made it possible to increase the coefficient of fuel filling (Weight is 159 kg).

The Italian Navy ship armament includes the anti-ship rockets "Otomat" Mk1 and "Otomat Mk2. The fuselage of the PKR "Otomat" Mk1 is divided into the following 5 sections: the last stage, the warhead, the on-board SUN, the fuel, and the cruising engine.

Transport-launch containers of the PKR "Otomat" Mk2.

The radio location GSN [Self-guidance nose cone] of the active type is located in the last section, and it has an antenna which scans in two planes and has an angle of declination of plus or minus 20 degrees. The accuracy of the self-guidance system for the vertical plane is 1.8 meters, and for the horizontal 3.3 meters. The on-board SUN provides guidance to the target within plus or minus 200 degrees, which reportedly requires almost no additional maneuvering on the part of the carrier vessel.

The warhead is equipped with a contact fuse and a non-contact fuse, and, reportedly, is capable of penetrating 90 mm thick armament at a direct angle. Inside of the warhead there are 60 kg of an explosive substance. When the warhead explodes inside the target ship the remainder of the rocket fuel ignites.

The PKR "Penguin" in the modified versions Mk1 and Mk2 is in the armament of the ships in the Norwegian Navy. The rocket Mk1 is built according to the "duck" aerodynamic plan wih a streamlined straight-across wing, giving the rocket a cross-shaped configuration. The wing is situated in the middle part of the fuselage, and four control surfaces are located in the nose cone. The rocket has the following three sections: the last section, the warhead, and the engine installation.

The flight distance of the "Penguin" rocket Mk2 is 10 km further than that of the Mk1. Also, the on-board SUN in this rocket has been improved.

The foreign press has discussed work on the modernization of series models of the rockets, and on the development of new PKRs. Thus at the present time, in France the PKR "Exocette" SM-39 is under development. They plan to equip submarines of the diesel type "Augusta" and of the atomic type "Ruby" with this system. The configuration of this rocket is the same as in the PKR "Exocette" MM-38, and the designs of the wing and control surfaces are the same as the PKR "Exocette" MM-40. Intramit is used as the fuel in the cruising RDTT of the "Exocette" SM-39, but in the TSU, isolan. The self-guidance nose cone and the on-board SUN (With the exception of the new on-board computer) are

the same as the components of the PKR "Exocette" MM-38. The "Exocette" SM-39 rocket will be launched from the torpedo device of the submarine carrier.

The ANS anti-ship rocket is currently being jointly developed by France and the FGR [Federal Republic of Germany]. As reported, the specialists are imposing the following requirements on that rocket: the capability to overcome an effective anti-rocket defense with a speed of Mach 2; to provide a high maneuverability (Calculated load factor of more than 10 units); to destroy the targets with a minimum possible altitude, at a great distance, and with low flight time; to be universal with respect to carriers for it.

In Italy an anti-ship rocket, the "Otomaks-2" is also being developed. Reportedly, the optimum speed of flight of the rocket will correspond with Mach = 1.8. The TRD is the proposed type of cruise engine with a thrust of up to 800 kilogausses. The control system is an independent inertial one with radiolocation or infra-red guidance.

AIRBORNE JAMMING STATIONS

Colonel V. Savitskiy, Graduate Engineer, and Senior Lieutenant I. Kalinnikov

Tactical aviation is at the present time being equipped with radio jamming stations for group and individual countermeasures. The group protection stations are installed on special REB [Radioelectronic warfare airplanes] which are designed to cover groups of airplanes with radio jamming. Individual protection stations arm tactical aircraft for the purpose of breaking the enemy's accompaniement of them with his radio location equipment and training his weapon on them.

Thus, an AN/AQLQ-99 group countermeasures station has been developed for the specialized REB airplane of the US Navy, the EA-6B. It was designed to cover aviation strike force groups by means of developing responsive and noise radio jamming of enemy RLS Radio Location Stations] being used to detect aircraft and guide ZUR [Surface to air missiles] to them, and on-board RLS of the PVO [Anti-Air Defense] fighter aviation of the enemy. Responsive jamming, as is well known, is developed on the RLS screens which interfere with the reference points and make it difficult to separate out realistic targets. Noise interference has a masking action on useful signals, and may be used to suppress radioelectronic equipment of various types. The station consists of four receivers for warning about illumination, 8 jamming transmitters, a digital computer, a control and indication system, and a power supply. A jamming signal former with digital control is used in the station, which makes its direct communication with the computer possible. The computer develops the control signals in accord with the operator's commands coming from the warning receiver about illumination of the RLS of the enemy or from the storage device.

The following three basic operational regimes are used in the station: the automatic, in which the computer initiates the selection and analysis of the RLS signals as well as the control of the distribution of jamming; the semi-automatic in which the computer determines only the priority of signals being received, and the decision on the organization of the jamming is made by the operator; and the manual in which all control functions are done by the operator.

According to the control commands from the computer making an analysis of the performance parameters of the RES [Radio electronic equipment] being suppressed, an appropriate modulation of the high-frequency generator is accomplished. The signals are strengthened from the output of this generator through a

travelling wave tube, and they are emitted by the transmitting system. Moreover, a temporary separation of the emitted signals is used with a rapid change over of the carrying frequency.

The AN/ALQ-99 Station is situated in 5 containers, four of which are hung on underwing pylons, and the fifth under the fuselage. In each container there are one to two jamming transmitters (Depending on the range being covered). The set of 5 containers contains 8 transmitters, and it makes it possible to cover a range of frequencies from 64 megacycles per second to 10.5 henry cycles per second. Testing and control with the REP [Radio electronic suppression] device of the EA-6B airplane is carried out by three operators.

A variation of the Station, the AN/ALQ-99E is used to equip the specialized REB US Air Force Airplane the EF-111A.

This Station includes 10 jamming transmitters situated inside the fuselage of the EF-111A Airplane. It is pointed out that this makes it possible to preserve the high aerodynamic characteristics of the airplane, and, consequently, gives the possibility of using it directly for escorting strike forces of the tactical aviation also at supersonic speeds. The receiver of warnings about illumination within the equipment of the Station is situated in the forward part of the tail stabilizer, and the antenna of the jamming transmitters is under the fuselage in the cowling (It is 4.9 meters long).

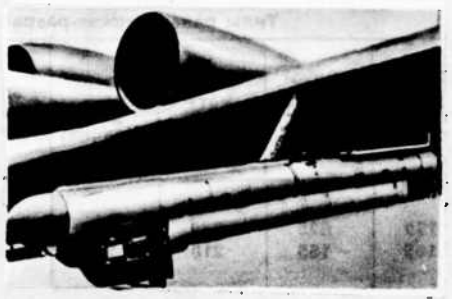
The AN/ALQ-99E Station has the capacity to develop noise and simulating jamming with radio electronic equipment operating in the range of frequencies from 64 megacycles to 18 henry cycles per second. The average output power of the Station is one to two kilovolts.

Known types of parameters for the suppressing RLS are input before the flight. If, during the flight new types of parameters should appear to the RLS, the operator must introduce changes in the mathematical programs of the computer during the flight. The presence of supplementary step-wise attenuators is a distinctive characteristic of the receiver part of the AN/ALQ-99E Station. These are used for large levels of signals of the RLS of the enemy for precluding overloading the input circuits. It is asserted that this makes it possible to use the EF-111A Airplane not only in zones under bombardment, but also above enemy territory.

Alongside group countermeasures stations on the EF-111A Airplane, for the organization of radio jamming self defense, the individual countermeasures AN/ALQ-137 Station is used. It is also situated inside of the fuselage, and is capable of developing jamming of the RLS in a range of frequencies from two to 10 henry cycles per second. The Station is designed to destroy the operation of the RLS in detecting and guiding by creating jamming inputting errors for the assessing of distance and speed. It operates in regimes of retranslation of signals

received, and emission of responsive pulse jamming. It also has the capacity to develop noise jamming in an uninterrupted emission regime. The output power of the Station is 100 volts in the uninterrupted emission regime.

In the USA, at the present time already several dozen various types of individual countermeasures stations have been developed for tactical airplanes. One of these is the widely used AN/ALQ-119 Three-Range Station. Initially it was planned that this Station would equip the F-4 Airplane which is used in combat activities in the Middle East. That Station is also used on the A-10, F-15, F-16, and the F-111 airplanes at the present time.

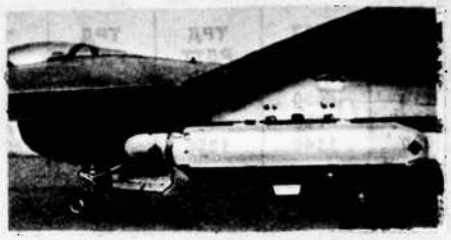


The AN/ALQ-119 Jamming Station in a suspended container on the A-10 Airplane.

The Station has a capacity to cevelop noise and simulating jamming of radio electronic equipment operating both in pulse as well as uninterrupted emission regimes in a range of frequencies from 1.55-10.9 henry cycles per second. The AN/ALR-69 Reconnaissance Receiver is part of the equipment of the Station. It is located inside the fuselage of the airplane, and the computer and jamming transmitter are situated in a suspended container (Its dimensions are 3930 X 540 X 320 mm).

The computer makes an analysis of the signals being received, and carries out an automatic control of the power, the frequency, and the type of modulation of emitted jamming signals. This makes it possible to accomplish the best suppression of useful signals.

The new generation Radio electronic Suppression AN/ALQ-131 Station has the capacity to develop noise and simulating jamming in a wide range of frequencies in uninterrupted and pulse operating regimes of an RLS guiding ZUR [Surface to air missiles] and RLS for control of fighter and interceptor airplanes. The system contains a receiver for warning about illumination, a computer, a jamming transmitter, and an independent power supply.



The AN/ALQ-131 Jamming Station in a suspended container on the F-16 Airplane.

The receiver controlled by the computer accomplishes a search and lock on of signals in the assigned frequency range. After locking on to the signal, the on-board computer analyzes its parameters and the nature of the threat, and then organizes control by the transmitters with the objective of optimal concentration of power of the jamming within the limits of the filtering band of the following system of the enemy's RLS. According to data provided by the foreign press, the digital assignment generator is capable of synthesizing up to 40 modularizing pulses of various shapes simultaneously. The computer controls the countermeasure equipment in accord with the concrete radioelectronic conditions on the basis of the programmed priority of the threat. The assertion is made that the mathematical programs of the system makes it possible to introduce corrections into the program during the flight.

The distinctive characteristic of the receiver of the AN/ALQ-131 Station is its capacity to conduct a continuous observation of the radioelectronic situation, including the time when jamming signals are being emitted. This provides an automatic optimization of the operational process of the transmitters in the form of a maximum coefficient of reinforcement of the channels of the relaying system. Its value is determined on each channel with a detector of the moment of critical saturation of the signal of the transmitter at the input to the receiver. With self-excitation, the coefficient of reinforcement of the channel decreases, and in the opposite case, it increases.

The containers of the AN/ALQ-131 Station have a modular construction, and they are produced in several modified versions. The varied contents of the modules makes it possible to create 16 variations of the system with the cover of from one to five sub-ranges of frequency. The single-range modified version has the lowest weight (136 kg). In this module, the receiver is located inside of the fuselage of the airplane. The three-range modified version of the station (With a weight of 233.5 kg) is the standard version, and it is placed in a 2.8 meters long container. The receiver and processor are situated in the lower

part of the container. The receiver and processor of the five-range modified version (With weight of 465 kg and dimensions lf 4400 X 620 X 300 mm) are also located in a container.

According to the observations of the foreign press, the AN/ALQ-131 Station is installed on the following airplanes, F-4, F-15, F-16, A-7, and A-10.

The foreign specialists observe that the REP stations which are positioned in containers degrade the aerodynamic characteristics of the airplanes. Additionally, it is difficult under these conditions to isolate the transmitting channels from the receiving channels. A solution of this problem is planned by redesigning the REP hardware which is designated for location inside of the fuselage.

The completely automated RAPPORT-2 Station for the exclusive countermeasure defense of the "Mirage-5" Airplane is an advanced station of such a type. Its components include a receiver with a digital processor, a jamming transmitter, a control and instrument panel, a radio direction-finder, and an antenna system. The entire set of hardware is built into the the form of 7 exchangeable units: two double-range power amplifiers, units with an assignment generator for the jamming transmitter and high-frequency part of the receiver, a unit with an intermediate frequency receiver and processor reinforcer, a control and instrument unit, and a two-channel radio direction-finder receiver.

The distinctive characteristic of the RAPPORT-2 Station derives from the fact that a central computer is used for control. The individual microprocessors serve to solve frequency problems. The introduction of a system of this design has made it possible to process several signals simultaneously, to increase the reliability of the system, to reduce the weight (To less than 100 kg) in comparison with stations controlled with one large computer.

In the surveillance regime, the receivers of the RAPPORT-2 Station automatically scans only that range of frequencies in which the enemy RLS is operating with the greatest probability. The central computer compares the measured performance parameters of the surveilled signals with the data derived from previous radiotechnical reconnaissance. After the identification of the signals, the radio electronic situation is displayed in azimuth planes on a screen in the pilot's cabin in the form of reference points with special designators for each type of RLS.

When operating in the automatic regime, the central computer transmits information about the detected and identified signals to the microprocessor which controls the countermeasure equipment. It accurately tunes the assigning generator to the frequency if the enemy's RLS within the order of their priority, establishes the optimum program of operation of the system, and chooses the direction for the emission of the jamming. The

digital assigning generator formulates the jamming signals which are then transmitted to the power reinforcers. The Station has a capacity to create camouflaging and simulation jamming for most of the types of currently produced RLS which operate within a range of frequencies from two to 20 henry cycles per second. The foreign specialists observe that, thanks to the high frequency of the sample of signals, and also to the capacity to operate in several regimes, the Station may create jamming simultaneously with several RLS of the enemy , and, moreover, for each of them it provides an optimum active jamming signal. The receivers under these conditions continue to scan the frequency range without interruption with the objective of searching the signals of other RLS of the enemy, and correcting the data on earlier detected signals.

It is proposed that the Station also be used as a basic REP device for the F-16 Airplane.

An improved version, the RAPPORT-3 Station, has been developed, in which, thanks to the use of supplementary modules, the power of emitted jamming has been increased, the range has been broadened to include more millimeter waves, and a relaying regime has been introduced.

According to the foreign press, the development of new REP stations is aimed at the creation of completely automated systems capable of setting up jamming of various types of radio electronic equipment of the enemy with a minimum participation of the operator. An expansion of the range of their operating frequencies and an improvement of the selection of the sources of signals of the enemy's RLS are being planned. Additionally, work on the development of antennas with electronic control of the beam is underway. The application of radio jamming stations in the complex with other on-board equipment of the REB, of centralized control of these with a computer, and coordination of the activity between airplanes equipped with the same hardware, according to foreign specialists, significantly increases the thoroughness of the defeat of the anti-air defenses of the enemy by the airplanes of one's own tactical aviation.

MATERIEL AND WEAPONS

This information is from Jane's Defense Weekly"

THE 7.62-MM SNIPER RIFLE, THE M-36

This rifle was developed in Israel. It is similar to the American M-14 Rifle, but it is built according to the "Bullpup" type. As a result, this rifle has been shortened to 850 mm with a barrel length of 560 mm (The length of the rifle with the silencer is 1030 mm).

All movable parts and almost all of the barrel of the rifle are situated inside of the direct rifle stock. A combined flash reducer and muzzle brake is mounted on the end of the barrel. This reduces the brightness of the muzzle flame and amount of recoil. This device may be replaced with a sound dampener of the shot.

The stock of the rifle is manufactured from laminated or graphite fiber plastic with a fiber glass coating for the barrel. For firing from a rest, light-weight supports may be used for firing from a rest.

The sight is calibrated up to 400 meters with 100 meter steps. A telescopic sight may be fitted to the rifle. The overall weight of the rifle is 4.5 kg.

THE RBS 15 ROCKET

This Rocket has been received as armament for torpedo cutters of the "Spika-3" type of the Swedish Navy. The Rocket has a launching weight of 770 kg, a length of 4.35 meters, a casign diameter of 0.5 meters, a wing span of 1.4 meters (0.85 meters in the folded configuration).

Up to 8 of the RBS 15 Rockets may be placed on one cutter. Each Rocket has its launch container.

The Rocket is equipped with two solid fuel booster engines with an overall weight of 172 kg and a cruising engine which provides a cruising speed of Mach 0.8.

A combined guidance system has been installed in which an altimeter and a radio location self-guidance tyoe nose cone are included. The nose cone operates on the final sector of the flight trajectory. The distance of flight is around 150 kilometers.

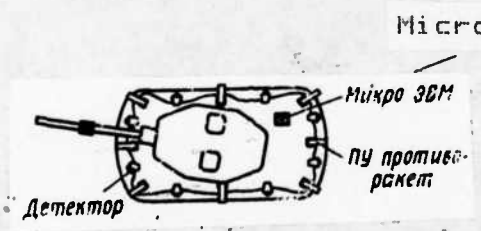
UNDER DEVELOPMENT

AN ACTIVE DEFENSE SYSTEM FOR TANKS

This information is from Jane's Defense Weekly"

This System designed by Israeli specialists is for the defense of tanks from the PTUR [Anti-Tank Controlled Rocket] and the jet-powered anti-tank grenade.

Up to 8 electronic optical detectors and the same number of small-dimension anti-rocket launching installations will be used in the system, situated along the perimeter of the tank body and connected with a micro-computer. The launching installations are oriented towards the sectors of activity controlled by their associated detectors, and they are equipped with self-guidance devices.



When a detector identifies a PTUR in flight towards the tank, a signal is transmitted to the computer which processes the signal, and gives a command for the release of the anti-rocket devices and for guidance to the target by the appropriate launch installation. The entire cycle is actuated automatically in the duration of 40 milliseconds. The computer gives a signal on a special display board to the tank commander about the processing that takes place in the system.

According to the developers, for the desired destruction of the on-coming rocket (With a speed of 300 meters per second) should be identified by the detector at a distance of not less than 20-25 meters from the tank, and its destruction should take place before it is 8 meters from the tank.

A DOUBLE-BARREL 25-MM AUTOMATIC GUN INSTALLATION

This information is from the "International Defense Review"

This weapon has been developed in the USA. It was designed

for use on combat airplanes and helicopters.

A belt feed for the ammunition is planned. It is presupposed that firing will be carried out alternately from the left barrel and then from the right (Thus, at the moment that a shell is being fed into the breech and the shot being carried out from one barrel, the spent shell is being ejected from the other). The rate of fire is 2000 shots per minute.

Explosive shrapnel incendiary, tracer, armor-piercing incendiary, and armor-piercing hard core shells are fired from this weapon.

The weight of the installation is 86 kg, and the size is 221 cm in length, 22 cm wide, and 20 centimeters high.

A JET-PROPELLED WEAPON

This information came from the German publication "Soldat und Technik" ("The Soldier and Technology")

An LAR 160 [Light Artillery Rocket] is being designed for American rapid deployment forces with the Israeli RC30 as a base. It is planned that the weapon will be towed by the M998 "Hammer" cross-country vehicle.

The weapon will have a packet of 9 or 11 launching tubes. Use of 160-mm jet-propelled projectiles or ammunition is proposed.

The weight of a projectile is 110 kg, of the engine is 36 kg, and of the warhead is 50 kg. The length of projectile is 3311 mm, of the engine is 2032 mm, and of the warhead is 1279 mm. The span of the hinged stabilizing surfaces is 350 mm. The range is from 12 to 28-30 km.

The projectiles are located in containers which are placed in the launching tube. These are made of polyurethane foam and covered over with plastic ends. After firing, the packet is discarded. The design of the projectiles makes it possible to use any 155-mm artillery shell for the warhead.

BEING TESTED

THE ERC90F4 COMBAT RECONNAISSANCE VEHICLE

This information comes from the
"International Defense Review"

A Combat Reconnaissance Vehicle with a 6 X 6 wheel arrangement has been developed in France. The combat weight of the vehicle is 10 tons. It has a crew of three.

Either a dual carburetor engine or two diesels with a supercharging booster. The engine is mounted in the rear.

The vehicle is hermetically sealed, and its armor provides protection from bullets up to 7.62 mm and from small shrapnel. It is equipped with an automatic transmission having four gears forward and one in reverse. The suspension of all wheels is independent. When driving along hard-surface roads, the central pair of wheels may be lifted with a hydraulic system which is provided.

A rotating two-place tower is installed on the vehicle. The basic weapon is a 90-mm Gun which is paired with a 12.7-mm machine gun. A second machine gun of this type is installed in the open on top of the tower, and it is used for anti-aircraft purposes.

The allottment of ammunition includes 26 rounds for the Gun (Eight of which are located in a drum which is part of a semi-automatic loading system) and 600 12.7 mm cartridges. Two units with four grenade-launchers each are mounted on the tower to the right and left of the gun, and are used to lay down smoke screens.

Laying of the weapon is accomplished with elecric drives in 360 degrees in the horizontal and from minus 8 degrees to plus 15 degrees along the vertical axis.

The fire-control system includes a periscopic sight of the commander with a night-viewing branch, a periscopic gunner's sight with a built in laser range-finder and an electronic ballistic calculator.

The vehicle moves at 8 km/hr in water by using two water-jet propelling devices situated in the hold. The speed of movement on the highway is 110 km/hr. The range for the fuel supply is 800 km with the diesel engines and 700 km with the gasoline carburetor engine. The capacity of the fuel tanks is 350 liters. The vehicle's surmountability of obstacles is as follows: up-hill grade, 60 %, hillside slope, 30 %, ford, 1.2 meters, and vertical wall, 0.8 meters. The dimensions of the machine with the gun in front are: length, 7.97 meters, length without the gun, 5.57 meters, width, 2.76 meters, and height, 2.43 meters. Clearance is 0.4 meters.

A RADIO LOCATION STATION MSR [EXPANSION UNKNOWN]

This information is based on data from the publication "Military Technology"

This Radio Location Station MSR of the military anti-air defense forces is a British development. It is a Doppler Continuous Emission Radio Location Station operating in the M(60-100 henry cycles per second) frequency band.

The MSR Station may service up to 6 anti-air defense systems of various installations issuing the azimuth and angle of location of the target on their displays.

It has been established that the Radio Location Station may operate under the conditions of ground interference and detect helicopters in their hovering regime. Additionally, the Station may be used to guide rockets of the "Air to Earth" class.

THE RAMP-V MULTI-PURPOSE VEHICLE

This information is from "Jane's Defense Weekly"

The Ramp-V Multi-Purpose Vehicle is being tested in the USA. It is designed both for paratroop as well as other types of troop use, and it may be used as a base on which are built up reconnaissance, staff, medical vehicles, anti-aircraft rocket systems, and anti-tank weapons.

The body, the engine, the transmission, and the chassis are mounted on the frame, and welded of steel tubes. The gasoline V-6 type engine is located in the rear of the vehicle. The radiator of the cooling system is located to the front.

The weight of the vehicle is 998 kg. The maximum load capacity is 1364 kg. The seating capacity is for 8 persons. The dimensions are as follows: length 4.37 meters, the width is 1.93 meters, and the height is 1.78 meters. The clearance is 0.406 meters. The wheelbase is 2.74 meters. The maximum speed on the highway is 136 km/hr. The range on the available fuel is 800 km (480 km over rugged terrain). The suggested maximum climb is 55 degrees, and the hillside slant 45 degrees.

THE RBS56 ANTI-TANK WEAPON "BILL"

This weapon was developed in Sweden. It was designed for destroying tanks at a distance of two kilometers. A crew of three operate and care for this Weapon.

The target is destroyed from above with a hollow-charge warhead with a time fuse with a burst from which the hollow charge is directed downward at a 30 degree angle. A method of aligning three points is used in the rocket guidance system.

Reportedly, the set may be used for firing at helicopters in the hovering regime.

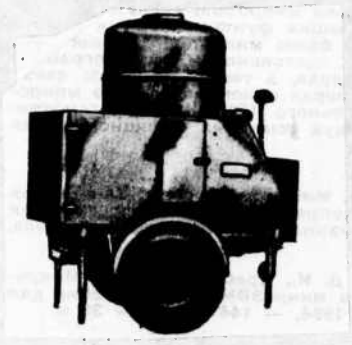
EARLY WARNING RADIO LOCATION STATION

This information is taken from the publication "Defense Material"

This early-warning radio location station for use against airplanes and helicopters has been given the name "Possum". It is being tested in England. The station is mounted on a basic trailer pulled by a motor vehicle.

The control panel which contains a circular scanning display may be carried away to a distance of 30 meters from the Radio Location Station. The course, distance, radial speed of the target, and the number and nature of the pieces of equipment of the radio-electronic warfare system in the given area. The Station is equipped with a recognition device for identifying aircraft as being either "Ours or hostile".

The data which is derived may be selectively transmitted to artillery or rocket anti-aircraft complexes. In this process, the operator indicates what kind of weapon should carry out the shot and the zones which are reachable to the weapons. The transmission of the data about the target with the computer of the Station is carried out either automatically or manually.



The Radio Location Station operates in the F(3.1-3.4 henry cycles per second) frequency band. The duration of the pulse is 8.5 or 94.5 microseconds. The peak output power is 2.5 kilovolts.

A helicopter in the hovering regime reportedly may be detected at a distance of 7 km with this device. Up to 27 targets may be displayed simultaneously on the screen.

A 120-MM SELF-PROPELLED MORTAR

This information is from Jane's Defense Weekly".

A 120-mm self propelled mortar, the VPX40M, has been developed in France on a Light, Tracked Armored Vehicle chassis. For the artillery unit, the 120-mm barrel of the RT61 Rifled Towed Mortar is used. This has been mounted in the forward part of the open platform of the chassis.

The ammunition stowage is calculated at 20 mortar rounds ready for firing. A 7.62-mm machine gun has been mounted in the hold of the vehicle on a turret.

In the firing position, the hydraulic suspension of the supporting rollers is cut off, and the machine sinks down with its bottom resting on the ground from which the weapon gets its stability when firing. The angles of control of the mortar extend from 45 to 85 degrees.

The maximum range of fire from the mortar is 13000 meers (17500 meters with an active jet-propelled mortar shell).

THE FOLLOWING ARE BEING MODERNIZED

THE ZB 298 RADIO LOCATION STATION

This information came from the publication "Military Technology"

The English specialists have improved the FASTAR ZB 298 Radio location Station, and it has been given a new designation, FASTAR. This coherent Doppler radio location station for the tactical unit has been supplied with a new goniometric platform which provides coverage by scanning an approximately 180 degree sector. The estimated range of action of the station is 20 km.

The fundamental distinctive characteristic of the new model is a control panel with a display screen. Sectors of the field of coverage (6.4 km for the distance and 8.75 km along the azimuth) of the Station may be displayed on the screen on a 1:50000 scale along with "Dead" zones. The scanning may be done automatically.

THE SG-77 5.56-MM RIFLE

This information came from the German publication "Truppendienst" ["Military Service"]

This SG-77 5.56-mm Rifle produced by the Austrians is equipped with a new device for attaching the American 40-mm M-203 Grenade Launcher.

The maximum firing range for area targets is 350 meters, and for pin-point targets it is 150 meters. Any grenades designated for use with American M-203 and M-79 Grenade Launchers may be used.

THE "CHAPARRAL" SURFACE TO AIR MISSILE SYSTEM

This information came from "Aviation Week" and "Space Technology"

The "Chaparral" Surface to Air Missile System is being improved in the USA. The work program includes increasing the average time of trouble-free operation of the air compressor and parts of the pneumatic system.

The Anti-Aircraft Rocket System will be equipped with an infra-red night vision system, which includes a heat-sensitive night visual device and a tracking optical system, a television screen for the gunner, an automatic target tracking subsystem, and a control panel.

The use of smokeless fuel to reduce the chance of disclosure of the rocket in flight is proposed.

BOOK SELECTIONS

MICROPROCESSORS

Lieutenant Colonel A. Rusakov, Graduate engineer

Current books are being published in the "Microprocessors" series. In one of these (the third book of the series)* microprocessor systems, their construction in microcircuits (Right up to the electrrical outlets), and operational time diagrams are given. The problem of synchronizing the functions of individual modules when they are integrated is dealt with in detail.

According to the authors, the kep problem in the design of a micro-computer is the construction of the storage systems of various types. In the book it is indicated that the success of microelectronics makes it possible to create storage with various principles of operation and interior organization (Dynamic and static, register and matrix, with random access and sequential retrieval of information, constant and electrical transcription, with ultraviolet erasing, etc.

A detailed examination of the basic elements important as such when studying microprocessors has been the theoretical base in this critiquing series of books, for the description of a more complex class of microelectronic equipment like the microcomputer. The fourth book** is devoted to that subject, and it is in essence the basic book of the series.

It contains general information about the structure of the separate functional units of the microcomputer and the organization of its control. Questions are also examined in the

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*Vorob'yev, N. V. and Verner, V. D., Mikroprotseccory. Elementnaya baza i ckhemotekhnika sredstv copryazheniya: ycheb. posobiye dlya VTUZov (Microprocessors. A Fundamental Base and the Circuit Technology of Interfacing Equipment: a Teaching Aid for Higher Technical Institutions of Learning). Under the Editorship of L. N. Presnukhin. Moscow. The Higher School, 1984. 103 pages. Illustrated. 20 kopeks.

**Gorbunov, V. L., Panfilov, D. I., and Presnukhin, L. N., Mikroprotsessory. Osnovy postroyeniya mikro-computer: ucheb. posobiye dlya VTUZov (Microprocessors. The Base of the Sturucture of the Micro-Computer. A Teaching Aid for Higher Technical Instutions of Learning). Moscow. The Higher School, 1984. 144 pages. Illustrated. 30 kopeks.

book about the main interior channels (Address, data, and control) which are designed for the change of information flow.

The authors indicate that the microprocessor is the basic element of the micro-computer. This consists of the following functional units and systems: the operational unit, the microprogrammed control unit, the operating, permanent, and reprogrammable memory, the input-output unit, and the system of communicating with the operational projects. The principles of the construction of two basic functional units of the micro-computer, the operational and the microprogrammed control units, have been examined in detail, using the K580 Single-Crystal Microprocessor and the K589 (K 1802) multi-Crystal Microprocessor.

Having presented the advantages of microprocessors and the micro-computer, the authors note that there are a lot of difficulties obstructing these devices coming into widespread use. One of these difficulties in the application of microprocessors is the complexity of checking out systems. The fifth book of the series*** is devoted to this subject.

It is well known that the traditional electronic circuits system check out resources (Oscillographs, signal generators, and other instruments) are not satisfactorily effective for systems containing microprocessors. The reason for this is the high degree of integration of the so-called active and passive elements in one crystal, and, as a result, a limited number of external outlets or test points for them. Therefore, the evaluation of the internal elements of the microcircuits by the method of direct measurement has turned out to be impossible. This led to the development of new methods and resources for system check out based on indirect techniques which are accomplished, for example, with logic analyzers, word generators, evaluative and check out complexes, and with develolpment complexes. Therefore the significant service of the authors is a description of the new means of check out applied to microprocessors. This makes it possible to trace all stages of the development of microprocessor systems.

The principles of construction of microprocessors and the method of using logic analyzers are studied in detail in the book. Logic analyzers are measuring instruments designed to collect data at test points of discreet systems, and to process this data and the displayed representations of them. A great

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***Vasil'yev, N. P. and Gorovoy, V. R., Mikroprotsessory. Apparaturno-programmnyye sredstva otladki: ucheb. posobiye dlya VTUZov (Microprocessors. Hardware and Software Check Out Resources: Teaching Aid for Higher Institutions of Learning)/ Under the Editorship of L. N. Presnukhin. Moscow. The Higher School, 1984. 95 pages. Illustrated. 20 kopeks.

deal of attention is devoted to the method of starting the analyzers and to their detection of short-duration signals and interference including the "Hook" regime.

Looking over the second class of testing and measuring instruments, i.e., word generators, or, otherwise, generators of test chains, the authors explain how an input testing action is fed to a microprocessor system being checked out. The characteristics of our native word generators are being introduced into the general knowledge.

Much attention is being given by the authors to the means of checking out microprocessor systems at the programming level, i.e., to evaluative complexes, development complexes, and to their software.

These complexes, as indicated in the book, are developed usually on the basis of universal micro-computers with the use of resources for emulation of the micro-processor (Emulation is the modelling of the system of commands from one computer to another machine). In this process, the entire design system is debugged at the program level, and the microprocessor is installed in the system only after the check out is completed. The authors impartially admit that such an approach uses the broad potential of the universal micro-computer, and makes it possible to check out, from a practical point of view, all of the software of the system being tested.

It is our opinion that the books being critiqued will without question be useful both to specialists working in the forces and to those who are hearers and trainees in military institutions of learning.

MILITARY PUBLICATIONS IN 1986

Kutsepalo, V. S., Vilinov, A. G., and M. Ye. Kisin, Spravochnik po remontu vooruzheniya (A Manual on the Repair of Weapons). Moscow. Military Publishing House, 1986. 23 plates, illustrated. Bound, 1 ruble 50 kopeks. 20,000 copies.

This manual contains information on the servicing of artillery rocket weapons. It examines the general problems of the organization and technology of routine repairs and major overhauling, and it introduces the technology of the repair of the more common parts, units, and systems of weapons.

Spravochnik serzhanta motostrelkovykh (Tankovykh) voysk (A Manual for the Sergeant of Motorized Rifle (Tank) Forces), under the editorship of V. A. Merimskiy. Moscow. Military Publishing House, 1986. 18 plates. Bound. 1 ruble 20 kopeks. 35,000 copies.

Seregin, Ye. P., Bychkov, V. Ye., Golovanov, K. N., and others, Ekonomiya goryuchego (Fuel Economy). Second edition with added materials. Moscow, Military Publishing House, 1988. 10 plates. Bound. 70 kopeks. 35,000 copies.

The book correlates experience gained in economizing on the use of vehicle fuel. The influence of the properties of fuel and the destinctive design characteristics of engines and various conditions characteristic for the driving of vehicles are examined. Recommendations for economy in the use of fuel are given. In this second edition, problems are presented on the economy of fuel when operating materiel under changing climatic conditions.

Voyennyy Entsiklopedicheskiy slovar' (The Military Encyclopedic Dictionary), Second Edition. Moscow, Military Publishing House, 191986. 194 plates. illustrated. Bound. 13 rubles 60 kopeks. 150,000 copies.

The Dictionary is a scientific reference publication which provides in a compressed form a systematic and uniform explanation of military concepts and terms. The terms reflect the socio-political (War, politics, military history, and military geography), military and military engineering (Armed Forces, military art, and military technology) subject matter. Brief biographic statements about State, political, and military professional people, military heroes, and illustrations in color and black and white.

Murashkevich, A. M., Frantsusko-ruskiy voyenno-tekhnicheskiy slovar' sokrashcheniy po aviatsionnoy i raketno-kosmicheskoy tekhnike (French-Russian Military-Techical Dictionary of Abbreviations in Aviation and Space Rocket Technology), Moscow, Military Publishing House, 1986. 15 plates. Bound. 1 ruble 90 kopeks. 15,000 copies.

The Dictionary contains around 10,000 abbreviations and conditional notations on the following subjects: airplanes and helicopters, rockets, space vehicles, satellites, orbiting stations; on-board and land-based equipment systems; engines and power installations; airports, cosmodromes, and experimental training grounds; flight and land-based personnel; air-traffic control; military, industrial, scientific research and transportation organizations associated with aviation and space technology; and several closely related areas of science and technology.

Belov, Yu. A., Kolimeyev, V. I., Polyakov, V. A., and Chernyak, M. N., Russko-frantsuskiy voyenno-tekhnicheskiy slovar' (Russian-French Military Technical Dictionary), Moscow, Military Publishing House, 1986. 80 plates, Bound. 8 rubles 40 kopeks. 20,000 copies

Solov'yev, V. I. and Shitova, T. Yu., Anglo-russkiy slovar' po svyazi (English-Russian Communications Dictionary), Moscow, Military Publishing House, 1986. 60 plates. Bound. 6 rubles 40 kopeks 20,000 copies.

The dictionary incorporates around 40,000 terms on the distribution of radio waves, equipment, communications complexes, communications systems, their terminals, communications centers, circuits, radio stations, radio relay stations, satellite communications stations, hydro-acoustic stations, and terminology related to communications in the fields of radio intelligence, radio countermeasures, electromagnetic compatibility, and control.

Blok NATO -- orudiye agressii (The NATO Bloc, a Weapon of Agression). 16 posters in an envelope. Military Publishing House, 1986. 4 plates, 60 X 90 X 4 (28.5 X 44.5 cm). 1 ruble 20 kopeks. 40,000 copies.

This set of posters with associated texts, Photographs, and satirical drawings reveals the reactionary substance , structure, and activity of the North Atlantic Treaty Bloc (NATO) which was created by the imperialists of the USA and its accomplices for the battle against the socialist countries and the national socialist freedom movements for the implementation of aggressive thinking of ultra-reactionaries of the imperialists circles, and for preparations for a new world war.

The content of the set persuades one of the necessity of increasing political watchfulness and battle preparedness against the imperialist aggressors.

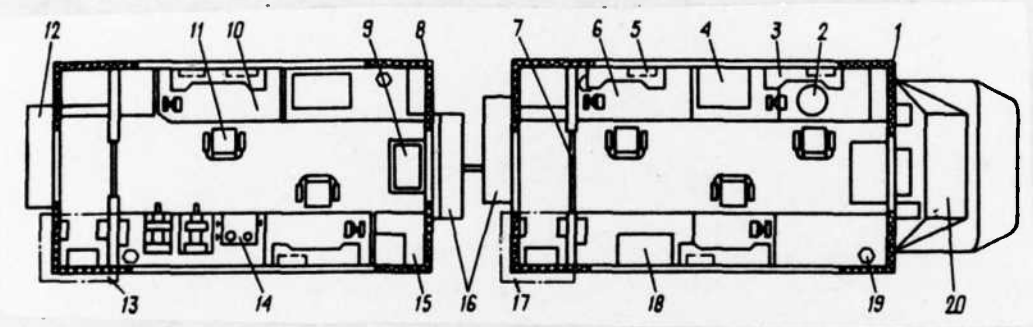
XXVII syezd KPSS ob ukreplenii oboronnogo potentsiala Rodiny (The XXVII Congress of the Communist Party of the Soviet Union about the reinforcement of the Defense Potential). A Set of 20 placards in an envelope. Moscow, Military Publishing House, 10 plates, 60 X 90/2 (44.5 X 57 cm). 1 ruble 92 kopeks. 40,000 copies.

The constant concern of the Communist Party, the Soviet Government, and the people is illustrated in the placards about the reinforcement of the defensive might of the homeland and the combat power of the Soviet Armed Forces. The basic positions of the documentation of the XXVII Congress of the Communist Party of the Soviet Union on problems about the armed defense of the Soviet State and the socialist countries from the infringements of the imperialist aggressors are revealed, and the intensive training workdays of the troops, the work of the Party organizations of the Army and Navy, and the leading role of the Communists in combat and political training, and in the performance of duties are shown.

THE PLIT-AR [MOBILE LABORATORY OF METROLOGY TECHNOLOGY-VEHICLE REPAIR]

Colonel G. Drapash and Colonel N. Moroz

The PLIT-AR Mobile Laboratory of metrology technology (Vehicle Repair) was designed for the performance of routine and middle-level repairs under field conditions, using equipment for measuring radiotechnical and electrical values.



The positioning of the equipment in the PLIT-AR Laboratory:

1 is a van body on the vehicle chassis; 2 is a turntable; 3 is drop shelf; 4 is a stand; 5 is a current supply panel; 6 is a repair bench; 7 is a sliding door; 8 is a van body on a trailer chassis; 9 & 18 are sources of current; 10 is a bench; 11 is an armchair; 12, 16, 20 are air conditioner units; 13 and 17 are shielded sections; 14 is a piston load manometer; 15 is a pedestal; and 19 is a rotating cash register.

If the laboratory is not thoroughly equipped with calibrating instruments, a check may be made of the rebuilt instruments.

The Laboratory Complex includes an "Ural-375A" truck with a trailer and the equipped van bodies. The work stations of the repairmen (Three in the truck body and two in the trailer) are equipped with sets of testing and measuring equipment, instruments, and devices, as well as a system of power supply. Bench stands for storage of testing and examining equipment and chests in which to store repair sets and ZIP [Sets of spare parts, tools, and implements].

Two portable work stations may be opened up alongside of the vehicle in special tents for the receipt and trouble shooting of measuring devices coming in for repair. If it should become necessary, a small cross-over platform is installed betweem the vehicle and the trailer.

At each of the work stations two rotating cash registers are situated for the disbursement of materials. Tools, repair devices, ZIPs of instruments, and the inventory of the Mobile Laboratory are arranged in the portable drawers of the benches.

The heating system and the air conditioning systems maintain a temperature in the van bodies of 20 plus or minus 5 degrees centigrade. The power supply to the Laboratory is available from distribution panels from an external network of 3-phase current with a voltage of 380 volts and at 50 cycles per second frequency or from distribution panels of the external network with single phase alternating current with a voltage of 220 volts and a frequency of 50 cycles per second. The required power is not greater than 15 kilovolts.

The Laboratory is equipped with general, local, duty-station, and emergency lighting, and it is equipped with the necessary fire-protection equipment. Positions where the personnel may rest, store their weapons and protective equipment are provided.

With the testing and measuring equipment, tools, and devices it is possible to carry out an instrument unit by unit trouble shooting operation on metrology equipment and other radioelectronic equipment; a diagnostics inspection of elements of electrical systems; electrical and radio repair work, including work on microelectronic parts; repair of components of kinematic units and of design parts of metrology equipment; and preventive maintenance of measuring materiel coming in for repair.

DEFINITIIONS OF TERMINOLOGY

Izmeritel'naya Ustanovka (Measuring Installation). An aggregate of functionally associated measuring equipment and auxiliary devices located in one place and designed for the processing of measuring data signals in a form convenient for the direct perception of an observer. Examples of such an installation is a bench for checking the operating capacity of various technical devices; calibrating installations for the reproduction of units of physical values; a checking installation for the transmission of units of measurement. Interfacing, current-source devices, and devices which possess measuring regimes belong to the remembering devices.

Ismeritel'naya sistema (Measuring System). An aggregate of interrelated communications channels for measuring equipment and auxiliary devices designed for the processing of signals of measuring information in a form convenient for automatic processing, transmission, and/or use in automatic control systems. At the present time, AIS [Automated measurement systems] have come into widespread use. The basic elements of these are unitized measuring equipment with microprocessors, and universal mini- and micro-computers.

Obraztsovoye sredstvo izmereniy (Calibrating Measuring Equipment). The gauge, the measuring instrument or transducer which is used to check other measuring devices and approved as the standard (GOST 16263-70) [State Standard]. As a rule, all OSI [Standard measuring equipment] are subjected to a metrology attestation. Depending on their metrology characteristics, they are subdivided into categories depending on their metrological characteristics. These categories serve as a basis for their metrological coordination of calibrating measuring equipment: the Second OSI, and the subsequent categories through the OSI of the previous categories.

According to the designator OSI, the categories are divided into initial OSI and subordinate OSI. Calibrating measuring equipment which is characterized by a high degree of checking circuits which are accepted in the given department of the metrology service belong to the initial category. Calibrating measuring equipment of a lower category in comparison with the initial is called subordinate equipment.

Rabocheye sredstvo izmereniy [Operational Measuring Equipment]. The equipment used for measurements not connected with the transmission of the parameters of units (Gast 16263-70). The working measuring equipment makes up the basic mass of operational measuring equipment. It serves for the conducting of technical measuring in the stages of development, manufacturing,

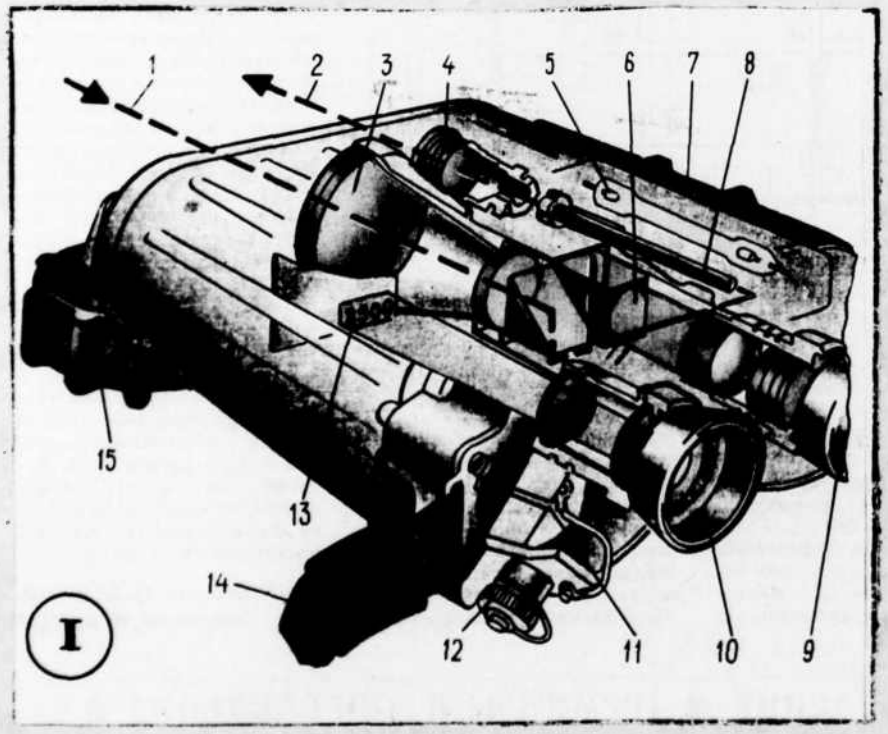
testing, and operation of obyekts for various measuring designations and in other objectives.

Voyskovyye sredstva izmereniy (Military Measuring Equipment). Equipment developed according to order of the Ministry of Defense of the USSR and designed for measurements at obyekts for military designation with operation in the forces. Military measuring equipment is divided into working, calibrating, and military standards. According to the degree of unification, they are subdivided into universal military and special military measuring equipment.

Nestandartizobannyye sredstva izmereniya (Non-standardized Measuring Equipment). Equipment which is narrowly specialized and narrowly departmental in its use, manufactured in individual models or in one-time groups, and not designated for series or mass production. Non-standardized measuring equipment is used in enterprises and organizations in production processes for the manufacture and testing of parts, tests of the regimes of technological processes, for the conducting of experimental and scientific research work. This equipment should undergo metrological attestation in accord with GOST 8.326-78.

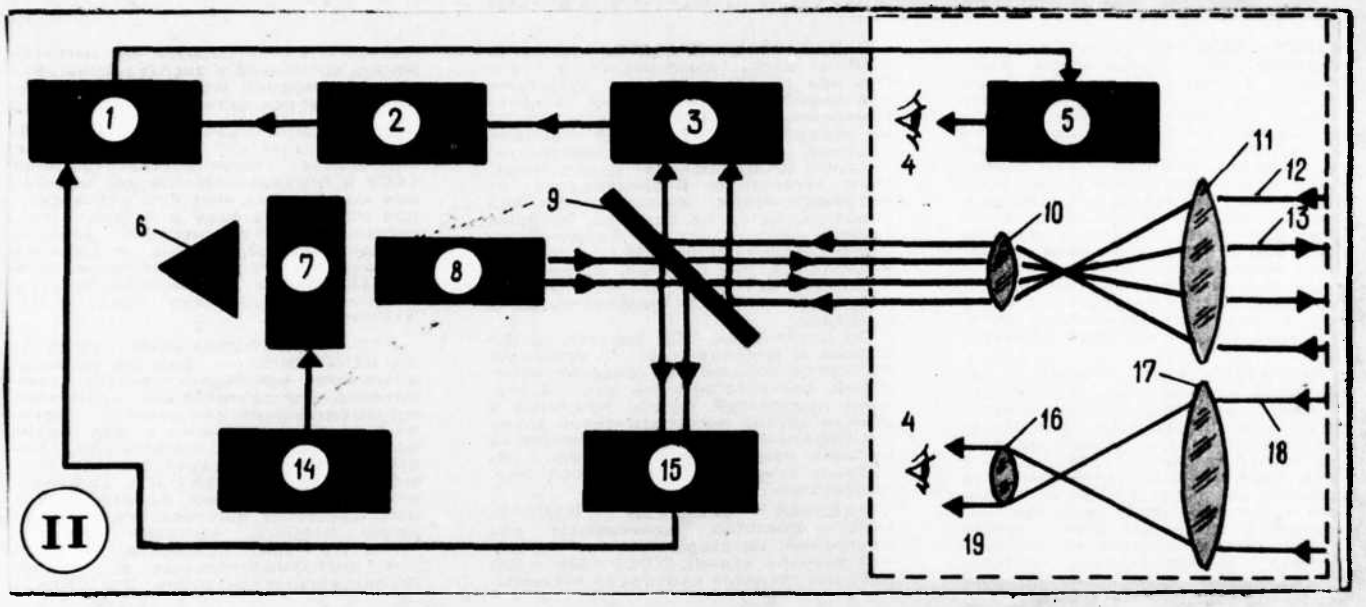
THE OPERATING PRINCIPLE OF A LASER RANGE FINDER

This drawing relates to the article on pages
"Laser Rangefinders"



I. Laser Rangefinder: 1. is a laser beam reflected from the target; 2 is the output emission from the laser; 3 is the lens; 4 is the output window of the emitter; 5 is the excitation lamp; 6 is the optical system of the view-finder; 7 is the range-measuring button; 8 is the laser transmitter; 9 is the eyepiece of the view-finder; 10 is the supplementary eye piece of the digital display unit; 11 is the independent power supply panel; 12 is the plug for the recharging power supply; 13 is the digital display of the measured distance on light emitting diodes; 14 is the instrument carrying strap; and 15 is the lens cover.

[redacted]



II. The main operational plan of the laser binocular range finder: 1 is the time lag measurement device; 2 is the amplifier; 3 is the receiver of the reflected signal; 4 is the eye of the observer; 5 is the digital display device for the distance to the target; 6 is the reflecting mirror; 7 is a modulator; 8 is the active element; 9 is a semi-dark mirror; 10, 11 are the optical system of the emitter; 12 is the laser beam reflected from the target; 13 is the output emission of the laser; 14 is the generator controlling the emitting; 15 is the supporting photodetector; 16 is the eyepiece of the optical view finder; 17 is the lens of the view finder; 18 is the reflection of the obyekt; 19 is the optical system of the binocular range finder.

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